## International POPs Elimination Project

***Fostering Active and Efficient Civil Society Participation in Preparation for Implementation of the Stockholm Convention***

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# Malaysia Country Situation Report


## Consumers' Association of Penang

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## About the International POPs Elimination Project

On May 1, 2004, the International POPs Elimination Network (IPEN http://www.ipen.org) began a global NGO project called the International POPs Elimination Project (IPEP) in partnership with the United Nations Industrial Development Organization (UNIDO) and the United Nations Environment Program (UNEP). The Global Environment Facility (GEF) provided core funding for the project.

IPEP has three principal objectives:

- Encourage and enable NGOs in 40 developing and transitional countries to engage in activities that provide concrete and immediate contributions to country efforts in preparing for the implementation of the Stockholm Convention;

- Enhance the skills and knowledge of NGOs to help build their capacity as effective stakeholders in the Convention implementation process;

- Help establish regional and national NGO coordination and capacity in all regions of the world in support of longer term efforts to achieve chemical safety.

IPEP will support preparation of reports on country situation, hotspots, policy briefs, and regional activities. Three principal types of activities will be supported by IPEP: participation in the National Implementation Plan, training and awareness workshops, and public information and awareness campaigns.

For more information, please see http://www.ipen.org

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## INTRODUCTION

Persistent Organic Pollutants (POPs) are chemicals that are toxic, persistent, mobile, accumulate in fatty tissue, and magnify in the food chain. Their high mobility makes them a global issue, while their other properties mean that POPs are hazardous to animal and human health even at low levels of exposure. Hence, it is essential that action is taken globally for the minimization and ultimate elimination of POPs.

Malaysia became a signatory to the Stockholm Convention on POPs on 16 May 2002 and is one of the 12 countries selected to implement a GEF/UNEP-funded project for the development of a National Implementation Plan (NIP) for POPs management. Alas, the general public is hardly aware of these developments.

Hence it is imperative that information on these chemicals' impacts on public health and the environment is more widespread and made available so that effective actions are taken to curb further release of POPs into the environment. The overall objective of this project undertaken by the Consumers' Association of Penang is to generate consumer awareness on what is POPs, their impacts to community health and environment and the situation of POPs management in Malaysia.

This country situation report on POPs describes the POPs situation in Malaysia, including known level of POPs and measures planned or underway to address them. Baseline information was gathered from various sources including reviewing the draft National Implementation Plan (NIP) being prepared by several task forces appointed by the National Coordinating Committee to coordinate the project implementation.

As this report reveals, all POPs pesticides listed in the Stockholm Convention were either deregistered or never registered by Malaysia's Pesticides Board. Nevertheless due to its persistent nature and probably illegal usage in agriculture, these POPs still could be detected in the environment.

Malaysia has banned the import of PCBs since 1995 but PCBs have been detected in all media due to their previous usage, existing stockpiles and unintentional release from combustion processes. Data on levels of unintentionally produced POPs, i.e. PCBs, HCBs, dioxins and furans are deficient as there is no complete inventory of source and environmental levels.

The unintentional releases of dioxins and furans, pose particular problems and challenges. While waste incineration has been identified as a major source for unintentional POPs internationally, there are several proposals to install incinerators nationwide as one of the solutions to waste disposal problem.

Malaysia's NIP for POPs management proposes several policy directions, with the ultimate aim of eliminating certain POPs and supporting transition to safer alternatives. Actions proposed to reduce and negate environmental impacts of POPs can only materialize if all parties take concerted actions. Institutional capacity

building, raising public awareness and ensuring participation from all stakeholders to tackle the problem of POPs and implementing the solutions is essential.

## WHAT ARE POPS?

Persistent Organic Pollutants (POPs): A class of toxic chemical substances that persist in the environment, accumulate in high concentrations in fatty tissues, bio-magnified through the food chain, has potential for long range transport thus widespread contamination.

Twelve initial POPs have been identified for action under the Stockholm Convention on POPs.

The Dirty Dozen

- Pesticides:
  - Aldrin
  - Dieldrin
  - Endrin
  - Chlordane
  - Heptachlor
  - 1,1,1-trichloro-2,2-bis (4-chlorophenyl) ethane (DDT)
  - Toxaphene
  - Mirex
  - Hexachlorobenzene (HCB)

- Industrial Compounds:
  - Polychlorinated Biphenyls (PCBs)
  - Hexachlorobenzene (HCB)

- Unintended by-products:
  - Polychlorinated dibenzo-p-dioxins (PCDD or Dioxins)
  - Polychlorinated dibenzofurans (PCDF or Furans)
  - Polychlorinated biphenyls (PCBs)
  - Hexachlorobenzene (HCB)

## SOURCES OF POPS

In Malaysia, POPs pesticides listed in the Stockholm Convention were either never registered or had been deregistered by the Pesticides Board. The last to be deregistered was DDT in 1999. What are remaining could be continued illegal use of POPs pesticides, old stocks of POPs pesticides at houses, stores and also instances where POPs pesticides like Mirex are sold unknowingly in night markets as household insecticides. Following is the registration status of nine pesticides POPs:

| | |
|---|---|
| DDT: | Deregistered in 1999 |
| Chlordane: | Deregistered in 1997 |

| | |
|---|---|
| Heptachlor: | Registration expired in 1989 |
| Dieldrin: | Registration expired in 1994 |
| Aldrin: | Registration expired in 1994 |
| Endrin: | Never registered |
| Mirex: | Never registered |
| HCB: | Never registered |
| Toxaphene: | Never registered |

Malaysia has banned the import of PCBs since 1995. Sources of PCBs in Malaysia are mainly from waste oil of transformers and consumer products like paint, carbonless copy paper, old fluorescent lighting fixtures, electrical devices or appliances containing PCB capacitors made before PCB use was stopped. While the importation of PCBs has been banned, the country does not have or maintain national inventories of PCB-contaminated equipment.

PCBs could have entered the air, water, and soil during their use in Malaysia. Wastes that contained PCBs were often placed in landfills. PCBs could have also entered the environment from accidental spills and leaks during the transport of the chemicals, or from leaks or fires in transformers, capacitors, or other products containing PCBs. Besides these, PCBs could have been emitted during combustion processes such as waste incineration and open burning in landfills.

Dioxins and furans are POPs that are emitted as secondary pollutants and produced unintentionally primarily through industrial and chemical processes and thermal processes. Sources of dioxins and furans would be from production and use of chemicals and consumer goods; waste incineration; ferrous and non-ferrous metals production; pulp and paper industries; landfill sites; power generation and heating; mineral products; cement production; transportation; crematoria; and uncontrolled combustion processes.

The unintentional releases of dioxins and furans, as well as HCBs and PCBs pose particular problems and challenges. One problem is monitoring, which is a difficult and expensive task. There are contradictions as well. While waste incineration has been identified as a major source for unintentional POPs internationally, there are several proposals to install incinerators nationwide as an important solution to the waste disposal problem.

There are already several units of municipal solid waste mini-incinerators with a capacity of 5 to 20 ton/day operating in the resort islands of Langkawi, Labuan, Tioman and Pangkor. In the past few years, there have been many more proposals to install incinerator plants in Kuala Lumpur, Selangor, Kuantan, Cameron Highlands, Penang and other major towns in the country.

A controversial, still to-be-built municipal solid waste incinerator plant in Beroga with a capacity of 1,500ton/day is estimated to cost RM1.2billion. Some of the other incinerator proposals come in the disguise of waste-to-energy plants, gasification plants, plasma, and pyrolysis plants.

Incineration facility is also available in an integrated hazardous waste treatment plant in Bukit Nanas, in the state of Negeri Sembilan. The plant, officially opened in November 1998 is modeled on the Danish hazardous waste processing plant, Kommunekemi in Nyborg. A hazardous waste management and disposal center which incorporates incineration and secured landfilling of scheduled and hazardous waste has also been planned in Mambong, Kuching Division, Sarawak.

The Malaysian government has also made it a national policy that all clinical waste must be incinerated. A comprehensive national system of incinerating clinical waste makes it now compulsory for all hospitals and clinics to incinerate their clinical waste. There are about a dozen regional and on-site medical waste incinerators with capacity of 20 to 500kg/hr already in operation.

There are also on-site industrial incinerators, for example a waste-to-energy plant in a paper mill to dispose waste paper sludge and a 4 ton/day combustion paint sludge incinerator in a national car manufacturer factory.

In 2001, there were 177 landfills in Malaysia and only 7 were sanitary landfills. The rest are open dumps and most of these dumps have filled up to the brim and have to be closed soon. These landfills are sources of dioxins, furans and PCBs releases besides other heavy metal contamination, toxic and greenhouse gases emissions. Landfill fires occur occasionally but there is insufficient data on number of incidences annually.

## LEVELS OF POPS

POPs Pesticides

A POPs Pesticides survey conducted under the NIP project found that none of the manufacturers have reported any stocks of POPs pesticides. Manufacturers reported that previous production of POPs pesticides were for local consumption only, probably due to strict export conditions.

The survey also revealed that likely stocks of POPs, as of year 2000 as stated below:

| | | |
|---|---|---|
| Aldrin (1994) | - | 0 |
| Chlordane (1997) | - | negligible |
| DDT (1999) | - | 4,580 litres of DDT 25 EC |
| DDT (1999) | - | 130 kg of DDT 75 WP |
| Dieldrin (1994) | - | 0 |
| Heptachlor (1989) | - | 0 |

Remaining stocks of DDT have been disposed at a hazardous waste management centre, i.e. Kualiti Alam Sdn Bhd in Bukit Nanas, Negeri Sembilan.

Surveys conducted in the early 1990s showed positive detection of pesticides contamination in paddy fields, surface water and sub-ground aquifers. Among the pesticides detected included endosulfan, Lindane and DDT.

A study reported under the NIP project also detected the presence of all POPs pesticides except for chlordane in river water. Further, except for chlordane and heptachlor epoxide, all POPs pesticides were detected in river sediments. Contamination was reported higher in agricultural areas in both instances.

One of the constraints of the above study on POPs pesticides was the difficulty in obtaining data due to possible reluctance of companies and dealers to declare old stocks of POPs pesticides. Further to this, there could be smuggling of certain POPs pesticides from bordering countries.

A recent press report (NST, 31/3/05, pg 24) stated that a study of water samples taken at Apu River in Cameron Highlands detected Aldrin and Heptachlor. It is suspected that farmers in the area were using these banned pesticides, causing their residue to seep into the water system.

In another study in 2005, Aldrin, Heptachlor and DDT were also detected in a river in Cameron Highlands, which is high pesticides usage area. Analysis of river water samples sent to a laboratory by a newspaper agency called KOSMO, found 0.970 mg/l of DDT.

Besides DDT, samples from Bertam River, Burung River, Kial River and three soil samples in Tanah Rata, Sungai Bertam and Brinchang found DDT metabolites, DDE and DDD.

For instance, a water sample from the Kial River in Tringkap, Cameron Highlands detected 0.810 mg/l 4,4'DDD, 0.140 mg/l 4,4'DDE and 0.970 mg/l 4,4'DDT (KOSMO, 10 April 2005) The presence of these pesticides reveal that banned pesticides are still being used by farmers.

These findings contradict the analysis of the consultant who prepared the pesticides component in the NIP report. This consultant insisted that banned pesticides were no longer used when this question was broached.

A study on the levels of Persistent Toxic Substances in freshwater was reported for several rivers in Northern Peninsular Malaysia (Tan, 2001). The report found that most organochlorine pesticides including HCHs were at relatively low levels in the river water suggesting isolated contamination of samples collected from nearby rivers in the earlier studies. However, PAHs and phthalate esters were exceptionally high.

**Mean Concentration (ng/l) of Persistent Toxic Substances In Several Rivers in West Malaysia (Tan, 2001)**

| Location | No of Sample | Aldrin | DDT | Dieldrin | Endo-sulfan | Endrin | HCH | Hepta-chlor | PAHs | Phthalates | Phenols |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Perak River | 9 | N.D | 10.22 | N.D. | 3.44 | N.D. | N.D. | 0.44 | 175 | 8706 | **114** |
| Juru / Perai River | 6 | 0.43 | 3.22 | 1.85 | 2.47 | 0.83 | 8.88 | 0.40 | 1544 | 8241 | **3559** |
| Muda River | 5 | 1.04 | 1.76 | 0.40 | 6.86 | 4.94 | 2.02 | 0.22 | 1227 | 2593 | **482** |

Reference: Tan, E.C. (2001) *Development of Analytical Method For Persistent Organic Pollutants In Fresh Water Using Solid Phase Extraction*. Ph.D Dissertation, Universiti Sains Malaysia.

Hossain (2001) conducted a study on the levels of organochlorine pesticides (OCPs) in marine biota to assess the level of PTS and to look into bioamplification effects of these OCPs in the Strait of Malacca. All samples were collected in offshore or coastal areas of the West Coast of West Malaysia. The results are summarised in the table below.

Most of the results are comparable with other studies in this region as well as other parts of the world. Total DDT was relatively low and decreasing compared with earlier studies in Malaysian marine biota.

An interesting observation was that coastal species such as cockles, mussels and shrimps contained higher levels of aldrin, HCH and heptachlor probably because of export from rivers and inland waters where agricultural activities were intensive.

Constant levels of POPs pesticides in the Malaysian environment suggested continuous input even though they have been banned from import.

Thus although some POPs pesticides have already been deregistered and some were never registered for use in Malaysia, there could still be those that were smuggled in, remnants left behind or households having old stocks that were not disposed.

**Levels of Persistent Toxic Substances (PTS) In Several Species Of Marine Organisms (µg/kg) In Malaysia (Hossain, 2001)**

| Marine Species | Concentration range of PTS (µg/kg wet wt.) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Aldrin | DDT | Dieldrin | Endosulfan | Endrin | HCH | Heptachlor |
| Blood cockle (*Anadara granosa*) | 0.02-2.5 | 0.04-1.24 | 0.01-0.7 | 0.10-3.25 | ND-3.25 | 0.74-10.23 | 0.27-3.54 |
| Cat fish (*Arius* sp.) | 0.2-2.5 | 0.1-3.2 | 0.02-0.5 | 0.3-0.8 | 0.1-5.4 | 0.9-5.9 | 0.3-8.2 |
| Green mussel (*Perna viridis*) | 0.02-15.7 | ND-7.8 | ND-0.9 | ND-2.6 | ND-9.1 | 0.32-11.28 | 0.1-14.6 |
| Jew fish (*Pennahia* sp.) | ND-9.5 | 0.1-6.0 | 0.02-0.9 | 0.3-3.8 | 0.1-6.2 | 2.7-7.1 | 0.9-5.7 |
| Mullet (*Valamugil* sp.) | ND-2.2 | 0.01-4.9 | 0.02-0.8 | 0.5-1.8 | ND-13.0 | 0.3-8.3 | 0.1-5.2 |
| Shrimp (*M. monoceros*) | 0.2-26.5 | 0-4.1 | ND-0.6 | ND-0.6 | ND-2.7 | 3.3-35.8 | 3.5-36.1 |
| Seabass (*Lates calcarifer*) | 0.5-8.0 | 0-0.5 | ND-1.0 | 0.01-3.4 | ND-9.1 | 1.7-5.1 | 0.7-21.7 |

Reference: Hossain, M.M. (2001) *Fate Of Organochlorine Pesticide (OCPs) Residues In Sediment And In The Marine Food Chain. Ph D. Dissertation*, Universiti Sains Malaysia.

PCBs

Survey findings on the inventory of PCB-containing equipment under the NIP project were not conclusive due to lack of response from industries and commercial centres. The response from large power companies and railway operations estimates transformers in the electrical power industry (from 11kV – 500kV) totaling about 54,200 i.e. about 80 million litres of transformer oil.

It was estimated that there could be 20,500 transformers in the factories and commercial centres based on the number of small- and medium-scale enterprises and large companies in the country. The volume of oil estimated on a proportional basis was about 30 million litres.

As for large capacitors for power factor correction, it is estimated that there were 20,500 capacitors based on the number of small and medium scale enterprises and large companies in the country. With an assumption of a maximum of 60 kg oil per capacitor, it is assumed that there were 1.23 million litres of oil. There is no data on small capacitors in fluorescent electrical and electronic components as it is difficult to track.

From 1998 to 2003, the hazardous waste incinerator, Kualiti Alam in Bukit Nanas had received 18.13 metric tons of PCB waste comprising PCBs, PCBs in capacitors and

capacitor banks and PCB oil from 10 waste generators. Over the same period, Kualiti Alam was reported to have received 22.08 metric tons of transformer oil where no information was provided on PCB contamination from five waste generators.

All PCB waste and transformer oil are incinerated. Prior to this, destruction of PCB wastes was carried out at approved facilities in developed countries with the consent from the relevant authorities.

Further to this, the NIP project report states that there are at least 171 dumpsites (closed and open) that pose as potential PCB contamination sites. It is reported that based on a typical solid waste composition, potential PCB-containing equipment and materials can account for between 20 to 40% of the total waste volume.

Dioxins and Furans

There is no complete inventory of dioxins or source and environmental levels of dioxins and furans in Malaysia. Studies on levels of dioxins in certain products have been done by local laboratories but not disclosed due to client confidentiality. Owing to this, assessment of dioxins and furans releases was done by researchers using the UNEP Dioxin Toolkit.

Some researchers find that the UNEP dioxin toolkit was not that suitable in Malaysian circumstances. There were problems associated with emission factors and the toolkit could not be used in its entirety for a developing country like Malaysia.

An assessment by Dr. Md. Sani Ibrahim of the Universiti Sains Malaysia using the UNEP Dioxin Toolkit estimated the total amount of dioxins and furans released by waste incineration processes in Malaysia in 2001 was 15.14 g TEQ. The estimated total releases of dioxins and furans from seven major cement production activities in 2001 was 2.11 g TEQ/year. Total dioxins and furans released by transports were estimated at 19.20 g TEQ/year.

In a study conducted in 2002 by the Japanese Offspring Fund in collaboration with the Consumers Association of Penang (CAP) to analyze contamination by PCBs, dioxins and furans in soils from dumping sites of municipal wastes, dioxin-related compounds were detected from all the soil samples analyzed. (Chemical analysis of dioxins followed the methods reported by the Japan Industry Standard with some modification.) High levels of coplanar PCBs were found in more urban areas such as Kuala Lumpur and Penang.

Relatively high TEQs (2,3,7,8-TCDD toxic equivalents), exceeding the environmental and monitoring standard set by the Japanese government, were found in soils from a dumping site in Selangor with levels at 3,100 pg/g and 50 pg/g on a dry weight basis. This indicates mass formation of dioxin-related compounds during combustion of waste at landfills and open dump sites.

TEQs in soils from the Kedah dumping site ranged from 7.8 – 48 pg/g on a dry weight basis. Those in Penang were 10-16 pg/g. TEQs found in soils from a controlled

dumping site in Kuala Lumpur were the lowest. These results suggest that in Malaysian dumping sites, emission of dioxin-related compounds relates to combustion in the sites.

## DAMAGE CAUSED BY POPS

POPs can disrupt endocrine systems, suppress immune system functions, and induce reproductive and developmental changes. The evidence of detrimental effects on living organisms at the level of entire populations of some POPs demonstrates the threat to biodiversity, and the potential for disruption at the ecosystem level. Organisms at the top of food chains, including humans, usually accumulate the highest body burden over their life time.

More specifically, some of the effects of POPs on human health and wildlife are listed below:

Effects of POPs on Humans

- Cancers and tumours at multiple sites.
- Neurobehavioural impairment including learning disorders, reduced performance on standard tests and changes in temperament.
- Immune system changes.
- Reproductive deficits and sex-linked disorders
- Shortened period of lactation in nursing mothers
- Diseases such as endometriosis, increased incidence of diabetes and others.

Vulnerable groups include women, infants, children, farmers, subsistence hunters and fishermen, occupational exposure in chemicals-related industries.

Effect of POPs on Wildlife

- Reproductive failure and population declines
- Abnormally functioning thyroids and other hormone system dysfunctions
- Feminization of males and masculinization of females
- Compromised immune systems
- Behavioural abnormalities
- Tumours and cancers
- Gross birth defects

The health of the Malaysian population is deteriorating. About 40,000 new cases of cancer are detected every year. In terms of risk, after correcting for unregistered cases, one in four Malaysians can be expected to get cancer in his or her lifetime if no other causes of death are in operation. Among the alarming revelations are that Malaysians have among the highest rates of nasopharyngeal, laryngeal and cervical cancers in the world.

## LAWS CURRENTLY REGULATING POPS

General Laws for Management of POPs

- Environmental Quality Act, 1974
  - Subsidiary legislations include

    - Environmental Quality (Sewage and Industrial Effluents) Regulations 1979
    - Environmental Quality (Control of Lead Concentration in Motor Gasoline) Regulations 1985
    - Environmental Quality (Prescribed Activities)(Environmental Impact Assessment) Order 1987
    - Environmental Quality (Scheduled Wastes) Regulations 1989

- Food Act 1983
  - The coverage of the Food Act is in regards to chemicals, to limit the amount of certain chemicals in products meant for human consumption by setting specific maximum residue level for various groups of food. Examples are food additives, antibiotic residue, and pesticide residue.

- Dangerous Drugs Act, 1952 (Revised 1980)
  - Regulates life cycle of dangerous drugs and substances to prevent and control that substances do not enter into illegal market.

- Poisons Act 1952
  - This is an instrument created in order to regulate importation, possession, manufacture, compounding, storage, transport, sale and use of poisonous substances or preparations.

- Sales of Drugs Act, 1952 (Revised 1989)
  - The purpose is to ensure the safety, efficacy and quality of drugs, and the safety of cosmetics. This is done through registrations of the drugs either imported to or manufactured in Malaysia. Responsible for the registrations are the Drug Control Authorities. Example of subsidiary legislation is Control of Drug and Cosmetics Regulations.

- Occupational Safety and Health Act 1994
  - The coverage of the Act is to secure the safety, health and welfare of persons at work. This Act has jurisdiction over all occupational sectors except for work on board ships and work in the armed forces.

- Explosives Act, 1957

- Petroleum (Safety and Measure) Act, 1984

POPs Pesticides

- Pesticides Act, 1974

  - The Pesticides Act is designed in order to ensure a registration of pesticides before these are marketed in Malaysia. The active substance in the pesticides has to be evaluated according to an environmental assessment, health assessment and specification according to efficacy. A pesticide registration has to be renewed every three years and new scientific knowledge and/or strengthened criteria can result in a refusal i.e. deregistration.

- Environmental Quality Act 1974 – Environmental Quality (Scheduled Wastes) Regulations 1989

PCB Control

- Customs (Prohibition of Imports) Order 1988 / 1998 – Customs Act 1967

  - First Schedule – Absolute Prohibition
    - Poisonous chemicals: Polychlorinated biphenyls, Polybrominated biphenyls, Polychlorinated Terphenyls

  - Fourth Schedule – Goods which may not be imported in Malaysia. Waste containing PCB and PCT
    - Spent oil contaminated with PCB or PCT
    - Discarded electrical equipment or parts containing or contaminated with PCB
    - Containers contaminated with PCB or PCT

- Environmental Quality Act 1974

  - Environmental Quality (Scheduled Wastes) Regulations 1989
    - Scheduled wastes from non-specific sources
      - NO12 -- spent oil contaminated with PCB or PCT
      - NO22 -- discarded electrical equipment or parts containing or contaminated with PCB or PCT
      - NO23 -- containers contaminated with PCB or PCT

- Occupational Safety and Health Act

  - Use and Standards of Exposure of Chemicals Hazardous to Health (USECHH) Regulations 2000

- List of permissible exposure limits
    - Chlorodiphenyl (42% chlorine) – skin: TWA 1 mg/$m^3$
    - Chlorodiphenyl (54% chlorine) – skin: TWA 0.5 mg/$m^3$

Dioxins and Furans

- Environmental Quality (Dioxin and Furan) Regulations 2004
  These regulations apply to the following four facilities:
  (i) Municipal solid wastes incinerator
  (ii) Scheduled waste incinerator
  (iii) Pulp or paper industry sludge incinerator
  (iv) Sewage sludge incinerator

  - For new facility (installed on or after 1 May 2004)
    - Compliance date : 1 May 2004 onwards
    - Concentration limit for air emission of Dioxin and Furan: 0.1 ng/$Nm^3$ TEQ

  - For existing facilities (already installed / purchased / acquired / under construction on or prior to 1 May 2004)
    - Compliance Date: 1 May 2004 - 30 April 2007
    - Concentration limit for air emission of Dioxin and Furan: to comply with the air emission limit for Dioxin and Furan as prescribed in the license under Section 18 of Environmental Quality Act 1974 or the approved conditions stated in the environment impact assesment report.
    - Compliance date : 1 May 2007 onwards
    - Concentration limit for air emission of Dioxin and Furan : 0.1 ng/$Nm^3$ TEQ

Scheduled Wastes

The Environmental Quality (Scheduled Wastes) Regulations 1989 stipulate handling, storage, treatment, notification and transport restrictions, and other requirements applicable to hazardous and toxic wastes. Scheduled wastes (specified wastes with toxic and hazardous properties) can only be treated, stored, delivered to and received at prescribed premises or at on-site treatment facilities. Transporters of waste must give notice of specified details of that transport. Reporting requirements are imposed on generators and persons who store toxic and hazardous wastes.

The management of scheduled wastes is also addressed in the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987. Under Schedule 18 of this order, toxic and hazardous waste treatment and disposal facilities are classified as prescribed activities. These facilities are required to undertake an

Environmental Impact Assessment and obtain approval before applying written permission for the construction of the facility.

The Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Order 1989 lists six different types of premises for which their occupation and use will require license from the Department of Environment. These premises include:

(i) Off-site recovery facilities used for the retrieval of material or product from any scheduled waste such as a solvent recycling plant;

(ii) Off-site treatment facility used for treating wastes which are not produced on the site such as centralized wastewater or effluent treatment plant;

(iii) Off-site storage facility such as those premises other than the premise on which waste is produced that is used by waste generators to store their waste while pending disposal at approved site. This facility also includes the premise of transport contractor.

(iv) Scheduled waste incinerator used for the thermal destruction of scheduled wastes including those constructed within the industrial premises of waste generators;

(v) Land treatment facility used for sludge farming of oily waste or sludges; and

(vi) Secure landfill facility used specifically for the disposal of scheduled waste including those landfills set up within the industrial premises of waste generators.

## NGOs and POPs

NGOs in Malaysia are quite active. They have been acting as a mediator between the general public and the authorities. Through NGO campaigns certain environmental issues have been brought to the attention of the authorities and some have been solved successfully. The mass media, both print and electronic, play an important role in inculcating public environmental awareness. Through media campaigns and seminars, these NGOs maintain momentum throughout the country on the issues involved. They also provide technical advice through scientific work and in certain cases legal advice to the affected communities.

Though each NGO may have its own agenda, many share the same vision, which is for a safe and healthy environment. Various NGOs in Malaysia have been conducting POPs awareness-raising programmes but not in a concerted way. Undoubtedly the NGOs here have played an enormous role in raising the level of environmental awareness among Malaysians.

The Consumers' Association of Penang (CAP) has been highlighting the harmfulness of toxic substances including POPs since the 1970s through its publications comprising of newsletters in four languages i.e. English, Malay, Mandarin and Tamil, books, booklets, posters and pamphlets. CAP's work on toxic chemicals including Endocrine Disrupting Chemicals and POPs is well-known through dissemination of its reports and publications. CAP also conducts education programmes to raise awareness among farmers and plantation workers. Alternative to pesticides usage are promoted.

Besides this, CAP had also collaborated with other international groups and networks to conduct studies, hold workshops and other educational activities to highlight the problems of POPs. Communities who would be affected by proposed projects that are potential POPs sources are alerted and mobilized to effect changes.

In 2000, in view that there were still no standards for emission limits for dioxin and furans, CAP submitted a memorandum to the Department of Environment urging immediate action in setting these standards. Finally the Environmental Quality (Dioxin and Furan) Regulations 2004 was gazetted.

In early 2003 an international symposium on PCBs was organized by CAP together with a Japanese organization. The symposium brought a team of researchers from ten countries in the Asian Pacific Rim to discuss the issue of PCBs in the region.

Regional-based NGOs like the Pesticide Action Network Asia Pacific (PAN-AP), World Alliance for Breastfeeding Action (WABA), International Baby Food Action Network (IBFAN) based in Penang and the Consumers International Asia Pacific Office in Kuala Lumpur also produce publications highlighting POPs issues with the view of raising awareness among target groups. PAN is an international coalition of citizens' groups and individuals who oppose the misuse of pesticides and support reliance on safe, sustainable pest control methods.

Centre for Environmental Technologies (CETEC) prepared the section on "Awareness Raising on POPs" in the NIP on behalf of the Malaysian Environmental NGOs (MENGO) Support Unit. Under the NIP, the expected output from this task force is a report presenting baseline information of POPs awareness in the country.

A national-level action plan for awareness-raising on POPs is also being prepared, providing information on the strategies and plans for awareness-raising. The report includes a plan for continued awareness-raising, education and information dissemination.

MENGO is a grouping of environmental NGOs in Malaysia, formed under a DANIDA-supported programme for environmental assistance to Malaysia. The objective of the programme is to contribute to the strengthening of the MENGOs and facilitate their impact on the decision making at all levels in the Malaysian society. One of the main strategic aims of the programme is to support and facilitate a more effective interaction between MENGO and the government of Malaysia. There are currently 18 NGOs registered under this programme.

The Consumers' Association of Penang (CAP) and Sahabat Alam Malaysia (FOE-Malaysia) are members of MENGO and are also IPEN NGOs. Both these organizations also gave inputs to the task force preparing awareness raising section for the NIP.

CAP has produced articles on dioxins, incineration, PCBs, EDCs, etc over the years. The articles were produced in CAP's newsletter called Utusan Konsumer which is published in four languages i.e. Malay, English, Mandarin and Tamil. Some examples of the articles which were compiled by CAP staff or condensed from other journals, magazines are as follows:

**Articles on Pesticides and POPs in Utusan Konsumer from 1994 – 2004**

| Month/Year | Title of Article | Page |
|---|---|---|
| January 1994 | Pesticides are Unnecessary Poisons<br>(Source: Northwest Coalition for Alternatives to Pesticides, USA) | 10-11 |
| July 1994 | Chlorine Pollution Linked to Breast Cancer<br>(article included organochlorine pesticides and PCBs) | 1-3 |
| Mid-August 1994 | Chemical Assault on Human Health<br>(by Ann Mish, WorldWatch March/April 1993) | 10-11 |
| December 1994 | Dismantling the Rubbish Mountain: Dangers of Burning Waste | 10-11 |
| Mid-September 1995 | Pesticides: Nowhere to Hide<br>(by Martha Horey, MS) | 10-11 |
| Mid-September 1995 | The Dioxin – Endometriosis Link<br>(by Sharon Lerner, MS) | 18 |
| November 1995 | Pesticides is Baby Food (including DDT, dieldrin) | 1-3 |
| Mid-July 1996 | Pesticide Contamination Continues (based on a CAP survey)<br>- pesticide cocktail includes chlordane | 5 |
| December 1996 | Du Pont, Dow and Destruction<br>Dow's Contribution – DDT, Dioxins and Death | 10-11 |
| January 1997 | Goodbye to Pesticides: CAP's Pesticide Free Framing Programme | 17 |
| Mid-January 1997 | Incineration: A Major Source of Toxic Pollution | 6 |
| July 1997 | Chemical Combinations Magnify Danger (include Chlordane) | 15 |
| September 1997 | Nowhere to Hide: The Global Spread of High Risk Synthetic Chemicals (DDT, PCBs, Dioxin-like compounds) (Source: Jennifer D. Mitchell, World Watch March/April 1997) | 14-15 |
| October 1998 | Losing Our Sperms: Cases of EDC Poisoning (PCBs, Dioxin, Bisphenol A, Phthalates, list of endocrine disruptors) | 1-4 |
| November | Poisoning Our Children: Children More Vulnerable to | 1-3 |

| | | |
|---|---|---|
| 1998 | Chemicals, Pollutants and Poisons | |
| November 1998 | Environmental Toxins Threat: Some of the Most Common Pollutants in Today's Environment and Why They Pose Special Risks to Children (including PCBs, Pesticides e.g. DDT, Municipal Incinerators, Toxic Waste Dumps) | 12-13 |
| November 1998 | Chemicals, IQs and Reproduction (by Marilyn Berlin-Snell) | 24 |
| January 1999 | Disposing of Household Hazardous Waste Safely | 21 |
| April 1999 | CAP Launches Campaign Against Hormone Disrupting Chemicals | 9 |
| July 1999 | Dioxin for Daily Use: The A-Z of Dioxins | 1-3 |
| August 1999 | Feeding Poison? Plastic Baby Feeding Bottles Leach Out Toxic Chemical – (Bisphenol A) | 1-3 |
| January 2000 | Obsolete Incinerator Technology Dumped in Malaysia: Shocking Finds at a Malaysian Clinical Waste Incineration Facility | 6-7 |
| January 2000 | Dioxin Exposure Related to Adverse Childhood Behaviour and Learning Capabilities | 22 |
| September 2000 | If Waste is a Problem, Incineration is a Disaster Incinerator: Rejected Hazardous Technology | 12-13 |
| October 2000 | The Road to Disaster: RM2 billion Incinerator in Sungai Besi | 12-13 |
| November 2000 | Playing with Fire: Hazards from Incineration | 17 |
| January 2002 | Medical Waste Should Not Be Incinerated | 11 |
| February 2002 | CAP Objects Waste Incineration Plan in Penang | 8 |
| May 2002 | Living Dangerously in the Chemical Age: Cancer and Chemicals (include pesticides, volatile organic compounds) | 1-5 |
| December 2002 | Chronic Poisons – Pesticides: A Major Hidden Health Threat | 12-13 |
| March 2003 | Persistent Pollution Peril: PCB Pollution Persist in the World Despite Stoppage of PCB Production in the mid-80s | 12-13 |
| April 2003 | Stop PCB Pollution: PCB Situation in Malaysia<br>High Levels of POPs Contaminate Malaysian Dumpsites | 16-17 |
| May 2003 | Penang Declaration on POPs | 17 |
| May-June 2004 | Toxic Chemicals We're Not Aware Of (by Jill Evans, member of European Parliament from Wales) | 18 |
| May-June 2004 | 40 Years After the US Military Sprayed Agent Orange in Vietnam (Source: Down to Earth Magazine) | 20 |

CAP also produced a booklet on Endocrine Disrupting Chemicals (EDCs) entitled "Going Extinct: The Future of Humankind Undermined by Hormone Disrupting Chemicals" in 2000 with the cooperation of Japan Offspring Fund and funded by Japan Fund for Global Environment. The booklet provides information on what

EDCs are and how these chemicals which are used in every aspect of our lives could affect us and our future generation.

In 1985, CAP published a book entitled "Pesticide: Problems, Legislation and Consumer Action in the Third World – the Malaysian Experience". This book gives a detailed account of the many problems associated with heavy pesticide use.

Sahabat Alam Malaysia (Friends of the Earth, Malaysia) produced a small guide titled "Your Home Guide to Zero Waste: What Do You Do With All This Rubbish?" in 2004. Among others, the guide highlighted the impacts of waste incineration and the toxic compounds, including POPs that is produced by waste incineration.

Centre for Environment, Technology and Development, Malaysia (CETDEM) is committed to improving environmental quality through the appropriate use of technology and sustainable development. CETDEM has available a group of Malaysian resource persons with extensive technical and research experience to provide expertise and advice in all the areas of its concern.

From time to time, CETDEM publishes specific reports and studies in the various fields of concern and it operates a documentation centre, which is open to other researchers and the public. Awareness raising programmes which have been covered since its establishment include environment, technology, organic farming, international issues, sustainable development, energy efficiency, renewable energy and Climate Change.

Centre for Environmental Technologies (CETEC) has been working on spreading clean technology and clean production among manufacturers. CETEC's core activities are among others, consultancy, education, training, information services on environmental issues and networking with others having similar interest. CETEC is preparing a report on awareness-raising on POPs for the NIP.

Pesticide Action Network Asia and the Pacific based in Penang coordinates a regional center dedicated to ensuring the empowerment of people, especially women, agricultural workers, farmers and peasants, and is committed to protecting the safety and health of people and the environment from pesticide use.

There are also a number of groups that work with farmers and plantation workers and their primary concern is the use of highly hazardous herbicides and pesticides which affect the health of workers and farmers. Among them are Era Consumer, Tenaganita, Plantation Community Support Committee and Alaigal.

## EFFORTS TO DEAL WITH POPS

In terms of studies on pesticides, the Pesticides Board and the Department of Agriculture conducts periodic studies on pesticide usage and pesticides residues. The Toxicology and Ecotoxicology Section of the Agriculture Department in collaboration with the Engineering Services Division of the Health Ministry had also formulated a

systematic study to trace pesticide residues in catchment areas and water treatment plants all over the country.

One such study was conducted in 2001/2 in Cameron Highlands where a total of 308 samples were analysed and out of this, 48 samples contained pesticide residues and 56 samples showed trace residues of pesticide. Only one sample exceeded the "National Standards for Drinking Water Quality" i.e. aldrin with a concentration of 0.048 microgram/L (NSDWQ for aldrin is 0.03 microgram/L). However most of the study reports are not made public.

Besides these, surveys have been conducted by various local public universities and research institutes like the Malaysian Agriculture Research and Development Institute. These local universities have many research papers based mainly on pesticides monitoring and some can be found on the respective university website. Unfortunately most research papers and findings are not publicised for public knowledge.

In preparing for the POPs Convention, the Department of Environment / Ministry of Science, Technology and Environment commissioned a public university i.e. University Kebangsaan Malaysia (UKM) in 1998 to carry out a study on the "Development of a National Programme to Control Persistent Organic Pollutants ".

The National Poison Centre at University Science Malaysia (USM) has also completed a study on pesticides poisoning in Malaysia. In 2004, the Consumers' Association of Penang carried out a study on women plantation workers particularly pesticide sprayers to determine the impact of the hazardous working conditions on their health. Although this study was not limited to POPs pesticides, we found that the women were suffering from acute pesticide poisonings and some could unknowingly suffer from chronic ailments.

The University of Science (USM), Malaysia is refining the methodology for organic pollution monitoring in Malaysian environments, working on various matrices including air, water, soil/sediment and tissue. Among others, the university has conducted studies looking at levels of organochlorine pesticides, persistent toxic substances in coastal sediments, marine organisms, fresh water and rivers.

The School of Chemical Sciences in USM has been doing POPs chemical monitoring for the last 10 years. The lab is capable of monitoring most POPs chemicals, for instance organochlorine pesticides, PCBs, polynuclear aromatic hydrocarbons (PAH), etc in various matrices such as water, sediments, tissues and foodstuffs. A project on "Regionally Based Assessment of Persistent Toxic Substances" which gives an overview of the current status of POPs chemicals in Malaysia has also been completed.

Among the POPs monitoring studies done were PAH contamination in coastal sediments in Langkawi (1994), POPs in Sungai Perak (2000), organochlorine pesticides (OCPs) in marine organisms from the Straits of Malacca, POPs chemicals in freshwater fishes, and POPs chemicals in selected foodstuff.

The Straits of Malacca is shaped like a sink, thus water holds in the straits without much flow. Pollution from inland sources would be concentrated in the Straits. Hence it is observed that coastal sediments and marine life caught from the Straits of Malacca have higher contents of chemicals like POPs, heavy metals, etc.

On the whole, there is very little data on environmental levels of POPs. Data is available on organochlorine pesticides (OCPs) in marine sediments and water compartments. Concentration levels of OCPs were generally low and decreasing temporally. Data on environmental levels of PCBs, dioxin and furans are rarely available. The data on stockpiles of OCPs can be obtained from the NIP but it is not conclusive. The presence of DDT and Chlordane needs to be monitored as they could come in different formulations and could also be sold in the black market.

As for POPs not on the dirty dozen list of the Stockholm Convention, some data is available on PAH, HCH, endosulfan, phthalates, and phenolics. HCHs, particularly lindane, were found at high concentration levels in river waters in Malaysia. Endosulfan was found to have relatively high concentrations in the environment. There is also non-specific data on organomercury, organotin and organolead. The emerging POPs chemicals like PBDE, bisphenol A, etc have to be monitored.

## STATE OF STOCKHOLM CONVENTION RATIFICATION AND THE NATIONAL IMPLEMENTATION PLAN

Malaysia became a signatory to the Stockholm Convention on POPs on 16 May 2002 and is one of the 12 countries selected to implement a GEF/UNEP-funded project entitled “Development of National Implementation Plans (NIP) for the Management of Persistent Organic Pollutants (POPs) in Malaysia”. Malaysia has yet to ratify the Convention.

The Malaysian government had established a structure for the management of POPs at national level. The National Steering Committee (NSC) on POPs is the main body that was established to look specifically into various aspects related to the management of POPs.

The Chair of the NSC is the Secretary General of the Ministry of Natural Resources and Environment whist the Secretariat is the Division of Conversation and Environmental Management. The committee is represented by government agencies, ministries, research institutions and NGOs. Organizations representing industries or businesses are considered NGOs. Thus the Chemical Industries Council of Malaysia is an NGO representative.

The main objective of the GEF/UNEP-funded project is to assist Malaysia in preparing a National Implementation Plan for the management of POPs and to identify actions at national level in controlling, minimising and finally eliminating POPs. In relation to this, the Department of Environment, as the national implementing agency, has formed a National Coordinating Committee (NCC) to coordinate the project implementation.

The NCC has set up six task teams to address the following areas:

i. Development of National Profile and Assessment of POPs Management Infrastructure
ii. POPs Pesticide Production and Use Assessment
iii. Polychlorinated Biphenyls Assessment
iv. Unintentionally Produced Chemicals Assessment
v. Socio-Economic Analysis of POPs Use
vi. Awareness Raising on POPs

Public participation in the process of developing the NIP is poor. Very few NGOs were invited to attend the first workshop on the development of the NIP for management of POPs held in Putrajaya from 28 to 30 April 2003. The Malaysian Environmental NGOs (MENGO) Support Office has been given the task to prepare the "Awareness-Raising on POPs" component.

Under the NIP, the Malaysian government also organized a regional training on the UNEP dioxin and furan toolkit with the involvement of Papua New Guinea and other countries. The training was held from 4 to 7 August 2003.

On 29 to 30 June 2004, a National Coordinating Committee and Stakeholders Workshop was held with the objective of presenting the National Implementing Plans for the management of POPs. The workshop also served as a platform for comments and suggestions for the final report of the project.

The second "National Coordinating Committee and Stakeholders Workshop on the GEF/UNEP Project: Development of National Implementation Plans for the Management of Persistent Organic Pollutants in Malaysia" was held from 24 to 25 May 2005. There were more than 150 participants comprising of government agencies, private sector, academe and NGOs. The objective of the workshop was to present the draft National Implementation Plan for the management of POPs in Malaysia and discuss issues of priority that has to be taken up in implementing the plan.

Public input in the development of the NIP is considerably lacking. For genuine public participation to take place, it is essential for information on health concerns and environmental harm due to POPs be made available to the general public. This could be done by highlighting the issue in the popular media and the media could be a tool to seek public opinion.

On the whole, the NIP proposes focused POPs policy directions, with the aim of:

- Eliminating existing POPs and supporting transition to safer alternatives
- Reducing and negating environmental impacts of POPs
- Improving the management and regulation of POPs and related activities and creating concerted actions for a POPs-free future (through institutional capacity building, increased awareness and understanding, and increased stakeholder participation).

Nevertheless the commitment of the government and adequate resources are needed to ensure that these proposals materialize.

## PUBLIC AWARENESS ACTIVITIES

Awareness among Malaysian public regarding POPs is still low. The NIP report states that as many as 80% of Malaysians do not know about POPs. More than 60% do not consider POPs as hazardous. The low level of awareness on POPs among the Malaysian public was attributed to their lack of understanding about the environment.

However this conclusion cannot be accepted in its entirety as the sampling for this study was small and is not representative of the entire population. Only 492 respondents from a number of residential areas in Peninsular Malaysia, Sabah and Sarawak were interviewed in the study. The respondents were sampled from population residing within 15 km from incinerators or facilities known to emit POPs.

Current activities in raising public awareness are not adequate as not all sections of society have been targeted. Dissemination of information on POPs is limited and does not reach the whole population. It is vital for information system to be improved and popular media used for wider information access.

Students in schools and higher learning institution should be exposed to issues related to POPs. Development of materials for inclusion in school and college curricula and programmes for implementation have to be worked out thoroughly to ensure message is reached. Besides this more public programmes to raise the awareness of Malaysians on POPs and toxics should be organized.

Although under the NIP the task force has formulated strategies and plans for continued awareness-raising, education and information dissemination, this could be hampered if resources are not available. Human and financial resources and the government's commitment and political will are essential for the NIP and public awareness activities to be actually implemented successfully.

## RECOMMENDATIONS ON ELIMINATING POPS

We should not only be focusing on eliminating a certain class of toxic chemicals but also should be promoting sustainable development. The Stockholm Convention together with the Basel Convention and the Rotterdam Convention would provide a model for international environmental governance and for collaboration amongst multilateral environmental agreements.

Waste incineration has been identified as a major source for unintentional POPs internationally. Although the Stockholm Convention does not ban incineration or prohibit the construction of new incinerators, it does place serious obstacles in the path of any incineration project.

The Convention specifically states in Annex C that "waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge; cement kilns firing hazardous waste" are among the technologies that have the "potential for comparatively high formation and release of such unintentional POPs." In fact, incinerators are significant sources of four of the 12 listed pollutants: dioxins, furans, PCBs, and hexachlorobenzene. As such, incinerators as a class are clearly subject to the restrictions of the Stockholm Convention. (GAIA: Waste Incineration: A Dying Technology)

Further, we have now reached a situation, where health studies on incineration around the world have reported associations between adverse health effects upon people residing near incinerators or are being employed at an incinerator. In most cases, health effects that have been associated with incinerators cannot be tied down to a particular pollutant. These studies are warning signs, which should not result in government inactivity, but rather to decisions being taken, which implement the precautionary principle.

Incineration should ideally be discouraged and phased out. No new incinerators should be allowed and the existing ones ought to be phased out in a move to reduce exposure to dioxin, furans and PCB emission from burning of waste. In the long run, we should be finding ways of reducing our wastes and adopting strategies of waste minimization.

In the interim, since incineration is still being practiced in Malaysia, we recommend the following: Presently under the Environmental Quality Act (Clean Air) Regulations, 1978, proposals to install, re-site or alter fuel burning equipment, incinerator or chimney are required to get written approval from the Department of Environment (DOE). An Environmental Impact Assessment (EIA) is also required to be done prior to approval. Upon approval and installation of the incinerators, operators should be required to monitor not only air emissions but also submit periodical environmental monitoring data taking into consideration all media and pathways of exposure.

The drawing up of the EIA and in considering whether a permit ought to be given for any new incinerator, the DOE must ensure that an analysis is done, which details the individual facility's impacts in the context of existing pollution and public health burdens in the community. The analysis must also include a description of vulnerable populations and take into account all exposure routes, such as dermal, ingestion and inhalation. The analysis must also include a study of the environmental and economic benefits of alternatives to constructing the new incinerators.

Proponents of new incinerators should also be required to conduct an alternative analysis. This analysis should identify alternatives to incineration, and describe the costs and environmental benefits of these alternatives and incineration. This analysis must be circulated for public review for 60 days, with extensions extended as requested for a good cause. All comments must be responded to in a substantive, legitimate and understandable manner, which clearly states and outlines the areas of disagreement or dissension. After the public's comments have been responded to in

writing, a public hearing should be held where members of the public can express their views to the local permitting agency and ask questions about the analysis.

Such procedures will give the public real and genuine right of participation in the decision-making process regarding the construction of new incinerators.

In terms of medical waste management, we recommend that the government reviews the current policy requiring hospitals and other health care facilities to incinerate clinical waste. Potentially infectious wastes do need treatment and disposal, and several non-incineration technologies are available to disinfect the waste. These technologies are generally cheaper, less technically complicated, and less polluting than incinerators.

A wide range of chemically hazardous wastes, including pharmaceuticals, are produced in small quantities in health care facilities. These are not amenable to incineration. Some, such as mercury, should be eliminated through changes in purchasing; others can be recycled; the rest should be carefully collected and returned to the manufacturer. Case studies are available, showing how these principles work in widely varying environments, such as a small maternity clinic in India and a major urban hospital in the United States.

It is important that Malaysia follows the precautionary principle. In this case the precautionary principle is to ban a pesticide or toxic substance if there are reasonable grounds to indicate potential harm to health and the environment even if cause and effect relationship has not been established scientifically.

Strategies to prevent generating incinerable waste streams currently exist by toxic use reduction planning within industries; waste reduction and alternative forms of sterilization in hospitals; and efficient reduction, recycling and compost actions at community level for household waste. A clean production approach, which substitutes safe materials and processes to stop the generation of hazardous waste in the first place, is needed.

## RECOMMENDATIONS ON INVENTORIES

- Have an inventory on local activities that release dioxins, furans, PCBs and HCB. Inventories produced should list industrial processes in which POPs are known to be produced and list the facilities that release the specific POPs into the environment.

- Have a national inventory for PCBs (sources and stockpiles)

- Periodic environmental and population monitoring for POPs, including epidemiological studies should be carried out.

- Conduct health risk assessments of POPs through dietary intake.

- Modify emission factors in UNEP toolkit by using a combination of scientific literature and measurements more typical of Malaysian facilities. In addition, develop and implement a source identification strategy based on chlorine processes to make sure that all potential dioxin sources are covered by the NIP.

- The Malaysian Pesticides Control Division and other authorities which have been regularly analysing pesticides residues in vegetables and fruits should submit their findings to be included in the national inventory.

- Emphasise bio-monitoring for a clearer picture of environmental toxicity.

- Analyse POPs in human blood, adipose tissue, organs.

- Conduct a cross-sectional study on POPs in humans.

- Compile data on neglected POPs and new emerging POPs.

- Create a data base on POPs chemicals and inventories.

- Study POPs residues/levels in contaminated sites, for example landfills.

- Identify organochlorine application areas.

## ALTERNATIVES TO POPS

Organochlorine pesticides production and usage should be eliminated. Farmers must be encouraged to use organic farming methods and cultivate without using pesticides and chemical fertilizers.

Currently POPs stockpiles like PCBs and hazardous wastes such as pesticides are still disposed via incineration even though combustion process invariably emits dioxins and furans. The only interim solution for treatment of these wastes is through technologies that can prevent, to the greatest extent possible, additional hazardous releases into the environment. Thus non-combustion methods should be proposed.

Non-combustion technologies are starting to make inroads into the treatment of wastes that have traditionally been incinerated. Gas phase chemical reduction has been used in Canada, Australia and Japan to treat PCB stockpiles. The U.S. Government has adopted biological treatment methods for one of its chemical weapons stockpiles. Nevertheless non-incineration technologies do not guarantee trouble-free destruction of hazardous wastes.

Alternatives to incineration exist and are economically viable. Numerous jurisdictions have rejected incineration in favor of programs that prevent, reuse, recycle, and compost discarded materials. The growing worldwide movement toward clean production and product design is supporting waste reduction strategies, further

eliminating the pressure for disposal options such as incineration. A variety of systems for diverting materials from disposal have been implemented worldwide.

To be effective, waste reduction programs, like all discard management systems, must be based on appropriate technical solutions and be designed with local conditions and needs in mind. The simplest, and generally least expensive, composting systems are those in which generators of organic materials compost segregated material on-site. Another option is to compost on a neighborhood scale. Vermicomposting — composting with worms — at the household and community level is one proven low-cost technique to divert organics from disposal.

Procurement of the government, businesses, industries and households should also be dioxin-free. This will significantly reduce the consumption of products that will increase dioxin exposure. Chlorine-based products should also be targeted and replaced by alternatives. Products like PVC, bleached paper, dry cleaning, pesticides, diapers, tampons which are linked with chlorine-dioxin should be banned from production.

Burning gasoline and diesel fuel produces considerable amounts of dioxin. Unleaded gasoline also remains a source of dioxin emission because it also contains chlorinated chemical additives. Thus private vehicle usage should be discouraged and public transport be stepped up. Reducing the pollution from motor vehicles will require a comprehensive strategy. Among them stringent emissions standards for new vehicles, specifications for clean fuels, programs to assure proper maintenance of in-use vehicles, integrated transportation planning and demand management.

## NEW POPS

Apart from the list of 12 POPs identified by the Stockholm Convention for the purpose of immediate action and management, there are other chemicals which are persistent in nature and possess similar POPs traits of lipophilicity and transportability. Some of these chemicals are used extensively in the region and might warrant a similar concern in the future as is being presently focused on the 12 identified POPs chemicals.

A December 2002 report of UNEP Chemicals, titled Regionally Based Assessment of Persistent Toxic Substances (Regional Report for South East Asia and South Pacific) revealed that Endosulfan was found in most sediments in the region, particularly in Malaysia, suggesting the recent use of this chemical because of its shorter persistence in the environment. HCHs, particularly lindane, were found at high concentration levels in river waters in the region particularly Malaysia and Thailand.

The following chemicals are presented as possible chemicals for inclusion in an enlarged POPs list.

**Hexachlorocyclohexanes**

Hexachlorocyclohexanes (HCH) is also commonly referred to as Benzene Hexachloride (BHC). There are two principal formulations of HCH. Technical HCH is a mixture of the alpha, beta, gamma and delta isomers of HCH. The other is 'lindane', which is pure gamma HCH. It is one of the most widely used insecticides in the world and is used against a variety of insects including sucking, chewing insects, ground and soils pests, household pests and wood preservation. HCH is relatively persistent, relatively less lipophilic as compared to the other POPs and is capable of being transported over long distances. Lindane is used for crop protection. At the First Conference of the Parties of the Stockholm Convention, Mexico announced intentions to nominate cyclohexanes to the Stockholm Convention list.

**Endosulfan**

Endosulfan is an organochlorine pesticide used on a wide variety of food and non food crops. Apart from commercial agriculture, Endosulfan is also used for gardening purposes. Endosulfan is mildly persistent and is moderately to highly toxic to birds and very toxic to aquatic organisms.

**Polycyclic Aromatic Hydrocarbons (PAHs)**

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot. Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides.

The persistence of PAHs varies with molecular weight. The low molecular weight PAHs are most easily degraded. The half lives reported for low molecular weight PAHs are between 9–83 hours in soil whereas those for higher molecular weight PAHs extend up to several years in soils/ sediments.

**PBDEs and BFRS**

Polybrominated diphenyl ethers (PBDEs) are a group of brominated flame retardants that are commonly used in consumer electronic products. PBDEs are persistent and bio-accumulative and levels in the environment are increasing rapidly. The primary health effects of the PBDEs occur during the development of the brain and reproductive organs. Exposures for the general public may come from many sources e.g. indoors, in our food, workplace, etc.

It is recommended that PBDEs be included in the POPs Convention list for elimination worldwide. At the First Conference of the Parties of the Stockholm

Convention, Norway announced intentions to nominate PBDE and the European Union recommended another brominated flame retardant, hexabromobiphenyl for addition to the Treaty list. Companies should be encouraged to find less toxic alternatives, including redesigning products.

### Organomercury Compounds

There are many sources of mercury releases to the environment, both natural (volcanoes, mercury deposits, and volatilisation from the ocean) and human-related (coal combustion, chlorine alkali processing, gold refining, and metal processing). The mercury from these sources may be discharged into rivers, river mouths and ultimately to the sea. In the aquatic environment, mercury cycling encompasses the microbial transformation to methyl mercury (MeHg). MeHg has a relatively high bioaccumulation and biomagnification capacity and exhibits high toxicity.

## CONCLUSION

On the whole, it is obvious that data and information on the environmental and health impacts of POPs is not readily available to the public. Community awareness is hence low. Public awareness is vital to affect changes in the government for better management, reduction and towards elimination of POPs in the country. Although Malaysia's National Implementation Plan for POPs management is now available we are concerned that without human and financial resources, government's commitment and political will, these plans would remain in paper and not fully implemented. We hope that this report would be instrumental in generating attention and action by the public and the authorities.

## RESOURCES/CONTACTS ON POPS

### Website

National Poison Centre website http://prn.usm.my

### Focal point for UNDP-GEF

The National Coordinator GEF Small Grants Programme
United Nations Development Programme
Wisma UN, Block C, Kompleks Pejabat Damansara
Jalan Dungun, Damansara Heights
50490 Kuala Lumpur, Malaysia.
Tel: 03-2095 9122/2095 9133 Fax: 03-2095 2870/2095 8022
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**UNIDO Malaysia Contact Point**

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