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Sambungan Artikel 'Oil Spill Disaster In Malaysia' akan diterbitkan di keluaran akan datang. Harap maklum.

- Editor -

MASM 2001 SARAWAK

MINGGU ALAM SEKITAR MALAYSIA 2001

MASM 2001 SARAWAK

- SARAWAK -

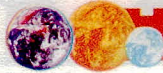
"Jangan Mencemar Sungai, Ia Nadi Kehidupan Kita"

Oleh AMIRUL ARIPIN



Negeri Sarawak sekali lagi telah dipilih untuk menjadi tuan rumah kepada sambutan Minggu Alam Sekitar Malaysia (MASM) 2001 di peringkat kebangsaan bagi kali yang ketiga. Negeri Sarawak yang lebih dikenali sebagai "Bumi Kenyalang" pernah menjadi tuan rumah kepada acara terpenting pengurusan alam sekitar ini pada tahun 1989 dan 1994. Sambutan MASM pada tahun 2001 berlangsung mulai 29 Oktober-4 November 2001 di mana Bandaraya Kuching telah dipilih sebagai lokasi Majlis Pelancaran MASM pada 29 Oktober 2001 yang telah disempurnakan oleh Y.A.B. Datuk Patinggi Tan Sri (Dr) Haji Abdul Taib Mahmud, Ketua Menteri Sarawak. Tema sambutan MASM 2001 "Jangan Mencemar Sungai, Ia Nadi Kehidupan Kita" membawa satu mesej yang amat penting kepada kita supaya menghargai kepentingan sungai terhadap kehidupan seharian dan tidak menjadikannya tempat pembuangan sampah-sarap, pelepasan kumbahan domestik ataupun effluen yang tidak dirawat. Kealpaan kita untuk menghayati kepentingan ekosistem sungai sebagai sumber air, media pengangkutan, sumber makanan dan aset pelancongan sudah tentu akan membawa kerugian kepada kita sendiri.

Y.A.B. Ketua Menteri Sarawak di dalam ucapan pelancaran MASM 2001 menyeru rakyat Negeri Sarawak khususnya supaya mempertingkatkan usaha ke arah memastikan alam sekitar yang bersih dan terpelihara. Beliau menegaskan bahawa isu urbanisasi hendaklah diberikan perhatian yang serius memandangkan ia merupakan penyumbang utama kepada pencemaran alam sekitar pada masa hadapan. Ketika ini, hampir 50% daripada penduduk Negeri Sarawak menetap di kawasan-kawasan perbandaran dan sudah tentu pertumbuhan kawasan perumahan, premis-premis perniagaan dan kilang-kilang akan meningkat yang secara tidak langsung memberikan tekanan terhadap masalah pencemaran alam sekitar. Y.A.B. Datuk Patinggi juga menambah bahawa kuantiti sisa pepejal di Kuching sahaja telah meningkat kepada



FROM THE DG'S DESK

Malaysia celebrated the 2001 Environment Week with the official launching by the Honourable Chief Minister of Sarawak on the 29th October 2001 in Kuching. This year's theme is "Jangan Mencemar Sungai, Ia Nadi Kehidupan Kita" or "Don't Pollute the River, it's Our Lifeline". Rivers are the source of drinking water and a vital raw material for industrial and economic development. The rivers should not be treated as open sewers or convenient dumping ground for our wastes. Once a river is polluted it would take tremendous efforts and huge financial resources to rehabilitate it.

Industries as the main producers of wastewater that eventually end up in our river systems, should endeavour to reduce the quantity of waste to the minimum. In this regard the traditional end-of-pipe treatment has proven to be insufficient, with environmental problems growing in tandem with economic growth, there is a need to look at pollution prevention, waste minimization and optimum utilization of resources. The Department is therefore encouraging industries to engage in cleaner production.

UNEP defines cleaner production as the "Continuous application of an integrated preventive environmental strategy applied to processes, products and services. It embodies the more efficient use of natural resources and thereby minimise waste and pollution as well as risks to human health and safety". An industry that engages in cleaner production can be cleaner by reducing hazardous emissions, cheaper by saving money and smarter by conserving resources. Waste minimisations can be implemented through raw material and process change as well as reuse and recovery.

In managing the country's environmental quality, the role of environmental professionals are equally important as that of the regulatory agency. The environmental professionals such as the consultants and contractors provide the bridge between the regulatory agency and the regulated community. Environmental consultants and contractors must maintain their professionalism whether as assessors in EIA studies, designing wastewater treatment plants or air pollution control equipment and even conducting ambient monitoring and stack sampling.

While the Department of Environment has registered EIA consultants on an administrative basis and in the process of registering environmental auditors, the environmental industry is strongly urged to establish a body to govern the conduct of the environmental professionals in terms of standards and ethics. A code of environmental practice would also be most welcomed. This would ensure that the services provided are up to the mark, serving the needs of the clients and at the same time protecting the environment.

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250,000 metrik tan setahun dan keadaan itu merupakan satu contoh yang jelas menggambarkan magnitud masalah alam sekitar yang berkaitan dengan proses urbanisasi. Beliau mencadangkan bahawa k a w a s a n - k a w a s a n perbandaran hendaklah dibangunkan dengan teratur dan mengambilkira polisi-polisi pengurusan sisa buangan secara lestari (sustainable). Perbincangan di antara Pihak Berkuasa Tempatan dan pihak perancang perindustrian perlu diadakan untuk mengkaji implikasi pengurusan sisa buangan ke atas pertumbuhan industri dan penduduk. Y.A.B. Datuk Patinggi juga menyeru agar generasi muda menanamkan sikap cintakan alam sekitar dan berganding bahu untuk mengekalkan keharmonianannya. Usaha-usaha ke arah mewujudkan kesedaran dan pemuliharaan alam sekitar haruslah dipertingkatkan lagi. Agensi-agensi Kerajaan perlu mempelajari daripada pengalaman negara-negara lain di dalam memantau alam sekitar terutamanya sungai-sungai yang telah menjadi nadi dan warisan negara. Usaha kerajaan untuk memelihara alam sekitar tidak akan berjaya selagi orang ramai tidak mengambil bahagian untuk memainkan peranan membantu usaha-usaha tersebut.



program gotong-royong di empat batang sungai terpilih, iaitu Sg. Tabuan dan Sg. Santubong di Kuching, Sg. Lembangan di Sibu dan Sg. Miri di Miri oleh Y.A.B. Datuk Patinggi dengan disaksikan oleh Y.B. Datuk Seri Law Hieng Ding, Menteri Sains, Teknologi dan Alam Sekitar, Y.B. Dato' Haji Zainal Dahalan, Timbalan Menteri Sains,

Teknologi dan Alam Sekitar, Y. Bhg. Puan Hajah Rosnani Ibarahim, Ketua Pengarah Alam Sekitar Malaysia dan tetamu kehormat yang lain. Persembahan koir dan sketsa MASM oleh kumpulan D'Cipta dari Kementerian Pembangunan Sosial dan Urbanisasi Sarawak turut menyerikan lagi suasana sambutan MASM 2001 yang berlangsung di Kuching Waterfront. Kemuncak pelancaran MASM 2001 pada 29 Oktober 2001 disusuli dengan beberapa aktiviti penting pada hari yang sama di antaranya ialah Mesyuarat Menteri-Menteri Alam Sekitar dan Ahli-ahli Majlis Mesyuarat Kerajaan Negeri yang bertanggungjawab ke atas hal ehwal alam sekitar (MEXCOE) kali ke-21 dan Majlis Malam Anugerah Langkawi. Jawatankuasa Induk Sambutan MASM 2001 telah mengatur beberapa aktiviti di sepanjang sambutan MASM 2001 Sarawak di samping aktiviti-aktiviti yang dilaksanakan di peringkat negeri di seluruh negara. Jadual di bawah menunjukkan ringkasan aktiviti-aktiviti MASM 2001 yang berlangsung di Negeri Sarawak.

Majlis Pelancaran MASM 2001 dimeriahkan lagi dengan pelancaran simbolik "Flag-off" para peserta

**MASM
2001
SARAWAK**

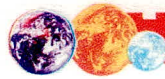
"Jangan Mencemar Sungai, Ia Nadi Kehidupan kita"

"Don't Pollute the River, It's Our Lifeline"

**MASM
2001
SARAWAK**

**JADUAL AKTIVITI SEMPENA SAMBUTAN MASM
PERINGKAT KEBANGSAAN 2001 SARAWAK**

Bil.	Nama Aktiviti dan Agensi Penyelaras	Tarikh	Masa	Tempat
1.	Kem Kesedaran Alam Sekitar (KeKAS) <i>Jabatan Alam Sekitar Sarawak</i>	9-12 Mei	0730-2300	Taman Negara Lambir, Miri
2.	Majlis Dialog Dengan Industri Berasaskan Kayu <i>Jabatan Alam Sekitar Sarawak.</i>	25 Sept	0800	Park City Beverly Hotel Bintulu
3.	Regional Conference on Natural Resources & Environmental Management (NREM 2001) <i>Lem. Sumber Asli & Persekitaran Sarawak.</i>	18-20 Okt	0730	Hilton Kuching



4.	Pelancaran Pameran MASM 2001 Pameran MASM 2001 (Sektor Swasta) Pameran MASM 2001(Sektor Awam) <i>Lem.Sumber Asli & Persekitaran Sarawak.</i>	18 Okt 18-20 Okt 18-20 Okt	1500 0900-1800 0900-1800	Dewan Suarah Kuching
5.	EnviroGolf 2001 <i>Jabatan Alam Sekitar Sarawak</i>	28 Okt	1200	Sarawak Golf Club Kuching
6.	Pelancaran MASM 2001 <i>Jabatan Alam Sekitar Sarawak & Kem. Alam Sekitar & Kesihatan Awam</i>	29 Okt	0700-1230	Waterfront Square Kuching
7.	Mesyuarat Menteri-Menteri Alam Sekitar dan Ahli-Ahli Majlis Mesyuarat Kerajaan Negeri yang bertanggungjawab ke atas hal ehwal alam sekitar (MEXCOE) <i>Jabatan Alam Sekitar (Ibu Pejabat)</i>	29 Okt	1400	Crowne Plaza Kuching
8.	Majlis Anugerah Langkawi <i>Jabatan Alam Sekitar (Ibu Pejabat)</i>	29 Okt	1930	Crowne Plaza Kuching
9.	Program Gotong-Royong Tebingan Sungai Santubong <i>Lembaga Sungai-Sungai Sarawak.</i>	29 Okt	1030	Bako Causeway Kuching
10.	City Tour <i>Dewan Bandaraya Kuching Utara</i>	30 Okt	0900	Kuching
11.	Program Gotong-Royong Sg. Lembangan <i>Majlis Perbandaran Sibul & Residen Sibul.</i>	3 Nov	0730	Sibu
12.	Program Gotong-Royong Sungai Tabuan <i>Majlis Bandaraya Kuching Selatan</i>	3 Nov	0730	Sg. Tabuan Kuching
13.	Pertandingan Melukis & Mewarna Peringkat Kanak-kanak Sekolah. <i>Kem. Alam Sekitar & Kesihatan Awam</i>	3 Nov 3 Nov 3 Nov 3 Nov 3 Nov 4 Nov 4 Nov	0800 0800 0800 0800 0800 0800 0800	Limbang Sarikei Kapit Sri Aman Bintulu Miri Sibu
14.	EnviroRide <i>Majlis Perbandaran Sibul</i>	4 Nov	0800	Bandar Sibul
15.	Program Gotong-Royong Sungai Miri <i>Residen Bahagian Miri & Majlis Perbandaran Miri.</i>	4 Nov	0730	Sg. Miri.

"Jangan Mencemar Sungai, ia Nadi Kehidupan kita" **"Don't Pollute the River, It's Our Lifeline"**



The changing roles of environmental consultants and contractors

by Ir. Shamsudin B. Haji Ab. Latif

(This paper has been adapted from a speech delivered at the Eight Annual General Meeting of the Association of Environmental Consultants, Malaysia (AECCOM), 25th November 2000, Petaling Jaya.)

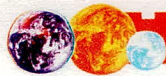
The role that has been played by the environmental consultants has been and still an important one. There is no doubt about the fact that the consultants have found a place of their own in contributing to the overall development of the country as well as the management of environment. The government has its own role - as the regulatory agency, DOE, for example puts out regulations, policies etc. and enforces them. The regulated community, for example, the industrial sector has its own role - to strive to comply with the regulations, to use environmentally sound processes and to bring into the market products which have less impact on the environment and bridging the two entities - the regulatory agency on the one and the regulated community on the other are environmental consultants and contractors. The public has also a role to play - they should practice a lifestyle that has little environmental footprint and also they should demand for environmentally benign products ("green products"). The roles played by all the players complement each other and ensure that environmental management is successful. Now let us focus our attention to the environmental consultants and contractors.

I think honestly in some aspects there are some differences in the role played by consultants in Malaysia as compared to the consultants in developed countries. In developed countries, some consulting companies are really big, employing several hundreds or thousands of employees with very strong financial capability, hence they are able to have their own research activities. Consequently, these companies are in the fore front in coming out with innovative technical solutions to specific environmental problems. But in Malaysia, the consultants are more geared towards importing technology and know-how, to be adapted and applied for the local conditions. To my mind, in the new millenium, the need is even stronger for the consultants to keep themselves abreast with up-to-date information on technology so that the latter can be made available to the industries in Malaysia. We shouldn't be promoting 'old-

fashioned technologies' which are not cost-effective and are unable to achieve good results. The consultants should promote the transfer of new and innovative technologies into the country and whenever possible collaborate with the research institutions, to develop our own technologies. I think with the spirit 'Malaysia Boleh' our consultants can do it.

Let us imagine a factory facing a wastewater compliance problem. Its effluents is not in compliant. In most cases a wastewater characterization study (WCS) is conducted to understand what the components of the effluent are; the flowrates start proposing for upgrading work. In most instances, the WCS is the only study that is conducted. Some consultants did not even do the study before they proposed upgrading work. Now we would like to promote a culture of doing some scientific investigation before a system is proposed. Many design proposals have not been based on reliable kinetic data relevant to the wastewater in question. Design based on sound and reliable data is more likely to achieve acceptable results than design based on general text-book information. As we know, kinetic data are wastewater specific. So the bottom-line is that the consultants would have to go one step further to do some form of technical investigation to back up their design proposal. This should add value to their work and ensure success and build up credibility.

Now, lets turn our attention to cleaner production (CP). We all have heard, that the end-of-pipe approach to pollution management is the last option that we should take after all the other options to prevent/reduce/recycle/minimize the waste have been explored. A good and responsible consultant engaged by a prospective industry will need to explore possibilities of introducing or implementing some elements of cleaner production right at the outset of the design stage. Waste segregation and water recycling are two simple practices which can be incorporated early in the design of many manufacturing processes. The benefits of CP are numerous and



the consultants need to convince their clients about this. The main drivers for CP are:- improved regulatory compliance; economy (savings); consumer demands (green consumerism); and social responsibility (inner values). End-of-pipe treatment approach does not eliminate pollution but CP reduces the environmental footprint. So the task to the environmental consultants is that they should also be promoters and agents of CP.

Next, let us discuss the issue of ethics. Statements on ethics are applicable and can be extended to all individuals, including you and me; whether we are consultants or otherwise. The environmental consultants, many of whom are engineers must at all times recognize that their primary obligation is to protect the safety, health, property and welfare of the public and additionally to protect the environment. Consulting engineers shall approve only the engineering work which, to the best of their knowledge and belief, is safe for public health, property and welfare and safe for additionally, the environment, in conformity with acceptable standards. So the point here is that to maintain professionalism, integrity, and good-name, we all must always uphold ethical values in our dealings with our clients. I am not implying that this has not been practiced but let us remind each other of our obligations.

Another important consideration is about multimedia approach in pollution management. The need for a multimedia approach is obvious. Historically, pollution control strategies in most countries started with single medium emphasis thus preventing the holistic approach to pollution management. The multimedia approach is similar to the CP concept of pollution prevention. We would like to see the environmental consultants playing a more comprehensive advisory role in ensuring that their clients pay bigger attention to addressing multimedia pollution instead of just looking at air or water pollution or scheduled waste, in isolation of each other.

The next issue is the need for training of industries' environmental personnels. Let us take a typical example. Often times when wastewater treatment system has been constructed and commissioned by the consultant and handed over to the industry, the industry in question does not have trained staff to operate and maintain the system. There are just not enough trained treatment plant operators to work in these factories and there are no training facilities to train them. What they need is not only classroom lectures but hands-on-training experience. Now, the consultants can fill this void. I understand that this area is a little 'way off' the normal working area of consultants, but I think it is a worthwhile

area to look into. Imagine the number of operators in the country that need training! So the point is clear, that is, may be environmental consultants can look into training as well.

The last issue is more relevant to the construction industry than the environmental consultancy business. It is about changing our work procedures. Let us imagine a construction site, either a big housing project covering hundreds of acres or a small project to construct a gas station, covering just a couple of acres. Don't we all see how the trees are being felled; how the hills are being bulldozed and levelled off; the deplorable state of erosion measures; how the trucks with dirty tyres from the site move on to the main road and depositing all the mud on the roads; the condition of the roads, public utilities/facilities in the vicinity of the construction area; - you can go on and on..... this lackadaisical attitude towards the environment and welfare of others should be stopped. We need to change our work procedures and work in concert with the environment.

CONCLUSIONS

Vision 2020 as outlined by our Honourable Prime Minister encompasses some challenges on environment which can be summarised as follows:

"In pursuit of economic development, Malaysia will ensure that:

- her valuable natural resources are not wasted
- the land remains productive and fertile
- the atmosphere is clear and clean
- the water is unpolluted
- forest resources must be capable of regeneration
- the beauty of our land must not be desecrated for the sake of economic gains."

Obviously, to fulfill the above vision, a paradigm shift is inevitable. Working in harmony with the environment makes a lot of sense, from various view points; be it from economic, business, ethics, religious, cultural perspectives, etc. The promulgation and enforcement of regulations alone will not suffice. Self-regulation, consumer demands, and social responsibility are becoming more dominant drivers for the change in mind set towards a more environmental friendly attitude.

Taking care of our environment is a shared responsibility. Let us all work together, to develop our country sustainably and bequeath to our children a nation that is healthy, clean and enjoyable place to live in. **IMPAK**

Environmental Impact of Clinical Waste Incineration

by Ir. Lee Heng Keng

INTRODUCTION

Under the Environmental Quality (Scheduled Wastes) Regulations 1989, pathogenic and clinical wastes, quarantined materials, discarded drugs except living vaccines and euphoric compounds are categorized as scheduled wastes, hence need to be managed as such. The Ministry of Health (MOH) estimated that the total amount of clinical wastes generated from MOH hospital to be 11550 kg/day or an average of 0.51 kg/occupied bed/day (Tan H., 2000)

CLINICAL WASTE MANAGEMENT IN MALAYSIA

The Ministry of Health Malaysia defined clinical wastes as:

- i. Any wastes that consists wholly or partly of human tissues, blood or other body fluids, excretions, drugs or other pharmaceutical products, swabs or dressings, syringes, needles or other sharp instruments being waste that unless rendered safe may prove **hazardous** to any person coming into contact with it; and
- ii. Any other waste arising from medical, nursing, dental, veterinary, pharmaceutical or similar practice, investigation, treatment, care, teaching or research, or the collection of blood for transfusion being waste that may cause **infection** to any person coming into contact with it.

In general clinical waste management system involves generation, segregation, storage, collection, transport, treatment and disposal (Tan H., 2000). Clinical wastes are segregated at the point of generation and placed in easily recognizable color coded containers or bags and labelled (Tan H., 2000), black for general waste; yellow for clinical waste for incineration only and light blue for waste for autoclaving or equivalent treatment before disposal. Collection is done on a daily basis or more frequently if needed using dedicated wheel containers, trolleys or carts to transport the bagged wastes to the storage area. Clinical wastes collected from the various departments are stored in a central storage area prior to transfer for on-site or off-site incineration (Tan H., 2000). The storage area is designed to accommodate 2 days of waste

generation. The stored wastes are transported for final disposal using suitable transportation vehicles and implementing the consignment notes system to track the movement of the wastes. The main mode for the final disposal of clinical waste is through incineration.

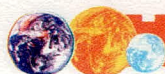
Incineration of Clinical Wastes

Thermal treatment or incineration refers to the conversion of solid wastes into gaseous, liquid and solid conversion products with the concurrent or subsequent release of heat. Thermal treatment process is categorized on the basis of air requirements, with combustion being a process in which stoichiometric or excess air is applied for complete reactions to occur. Gasification and pyrolysis are processes whereby the waste are burnt lean and in the total absent of air respectively (Mohd Rozainee T., 2000). All new clinical waste incinerators operated in the country use the gasification process.

In the gasification process, the wastes are fed into the primary chamber under starved air condition and the gasified gas burnt in the secondary chamber at temperatures exceeding 1000°C and residence time of 2 seconds. These operating conditions are maintained to ensure complete combustion of the waste materials and the emissions able to meet the stipulated standards. The ash produced is considered as scheduled wastes and need to be disposed at a licenced facility. The air emission standards imposed by the Department of Environment are as shown in Table 1.

Parameter	Standard
Smoke emission	Ringlemann No. 1
Particulate	0.2 g/Nm ³
Dioxin and Furan	0.1 ngTEQ/Nm ³
Sulfuric acid	0.1 g SO ₃ /Nm ³
Chlorine	0.2 g HCl/Nm ³
Hydrochloric acid	0.1 g/Nm ³
Nox	2.0 gNO ₂ /Nm ³
Arsenic	0.025 g/Nm ³
Cadmium	0.015 g/Nm ³
Mercury	0.01 g/Nm ³

Table 1: Air Emission Standards for Clinical Waste Incinerators



The air pollutants of concern are dioxin and heavy metals both from the stack and in the ash. Polychlorinated dibenzop-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) are collectively known as dioxins. These chemicals are highly toxic and human carcinogen. However their effects are linked to the dose, exposure, frequency and duration. Factors affecting the formation of dioxins in incinerators are combustion efficiency, post-combustion temperature and residence time.

ENVIRONMENTAL REQUIREMENTS

The Environmental Quality (Clean Air) Regulations 1978

Installation of fuel burning equipment, chimneys and incinerators requires written permission from the Director General of Environmental Quality. Emissions of smoke and gases are subjected to prescribed standards.

The Environmental Quality (Scheduled Wastes) Regulations 1989 and the Environmental Quality (Prescribed Premises)(Scheduled Wastes Treatment and Disposal Facilities) Regulations 1989

These regulations regulate the generation, storage, transportation, treatment and disposal of hazardous and toxic wastes. There are 107 waste categories prescribed as scheduled wastes. The control of toxic and hazardous wastes is based on the cradle-to-grave concept where all stages of wastes handling are considered.

However, the installation of individual incinerators for the disposal of hazardous waste is discouraged as the cumulative effect will bring about serious threat to public health and safety. Moreover an integrated scheduled waste treatment facility has been set up and in full operation. The facility includes a sophisticated incinerator approved to destroy hazardous wastes. It was approved only after the most thorough examination on siting, design, construction and operation procedures and protocols.

Only under extreme and exceptional circumstances would incinerators be licensed and all such applications would be subjected to very thorough and detailed examination of the needs and environmental impact. The detailed EIA procedure will be followed. Clinical wastes fall under this category.



Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987

The legal requirement for EIA came into effect on 1 April 1988. Under Section 34A of the Environmental Quality Act, 1974 any person intending to carry out any of the activities which are prescribed is required to submit to the Director General of Environmental Quality a report containing an assessment of the impact on the environment. The report shall be submitted for review prior to the granting of approval of the activity by the relevant authority. The installation of clinical waste incinerator is covered under activity 18a under the Order.

ENVIRONMENTAL IMPACT FROM CLINICAL WASTES INCINERATORS

Environmental impact can occur at the various stages of the installation of a clinical waste incinerator, from site preparation to operations, if inadequate mitigation measures are taken. Therefore concern for the environment needs to be addressed throughout the project cycle; that is right through planning, designing, site preparation, installation and operation. Major environmental issues are:

- i. Siting
- ii. Gaseous emissions
- iii. Effluent discharges
- iv. Noise
- v. Ash disposal
- vi. Health hazards and risk

Site selection

The selection of an appropriate site is important and need to take into account environmental impact including risk. The incinerator has to be consistent with existing development plan, master plan or land use plan to avoid in-



compatibility of land-use. Of utmost importance for consideration during layout planning is the concept of buffer zone. The incinerator should be sited in an industrial estate with adequate buffer zone within the development, between commercial, industries and residential areas to avoid nuisance. Here, reference should be made to the Guidelines for the Siting and Zoning of Industries published by DOE.

Environmental Health Risk Assessment

Environmental health risk assessment (EHRA) is carried out to determine the population risk from exposures to environmental hazards and part and parcel of the EIA report for clinical waste incinerators. Here assessment on the exposures to air emissions like dioxins, heavy metals and gases is determined. EHRA involves hazard identification, dose-response assessment, exposure assessment and risk characterization and the use of mathematical model to predict health impacts. As in all models there are inherent weaknesses such as input data, calibration and local conditions, however this additional information would provide for a more informed decision.

Risk Assessment

Risk assessment is also carried out to determine the potential risk from fires and explosion arising from the operation of the incinerator. From this assessment, mitigations are implemented to minimize the risk and also a basis for the preparation of the emergency response plan.

Selection of incinerators

The selection of incinerator needs to incorporate the findings of EIA's including health impact and risk assessment. The final selection of the incinerator should ensure efficient operation with minimal health and environmental impact. Mitigating measures proposed to minimize environmental impact need to be incorporated into the incinerator design. In this case the state of the art technology must be the first option to control emissions.

Site preparation Control of Earthworks

Earthworks contribute the highest impact if not carried out with proper environmental control. There is a need to plan the earthworks and implement control measures at the earliest stage. Appropriate sediment control measures must be incorporated as part of the development and developers, consultants and contractors must take this into account in their estimates and pricing. Sediment control measures must be in place before other earthworks commence. Earthworks

shall be scheduled to avoid rainy season and detailed earthworks plan shall be prepared and endorsed by a professional engineer. The Department of Environment has published the Guidelines for Prevention and Control of Soil Erosion and Siltation in Malaysia that provide a useful reference for housing developers and contractors. Techniques for the prevention and control of soil erosion are highlighted.

Operation Control of Air Pollution

Gaseous emissions are the most significant pollutants arising from the operation of incinerators. Air pollution control equipment is a very important component of any incinerator and in some instance can be as costly as the incinerator itself. Other than gases and heavy metals, incinerators are also emitters of dioxin and furan. In most cases dioxin and furan are products of combustion and hence optimum conditions must be maintained at all times to ensure minimal emission of these products. It is also important to ensure that no reformation of dioxin occurs in the subsequent cooling at the stack.

Control of Noise

Noise is unwanted sound and has various effects on human beings ranging from annoyance and discomfort to hearing loss. Sources of noise include the burner, fan and other moving parts. Noise control can be implemented by either engineering means, separation of source and receptor or through limiting the hours of operation of the noise source. As the incinerators are located in industrial estates and most only operate during the day, noise impact is not expected to be significant. Engineering methods could be the installation of quiet machines, insulating the machines or providing screens and noise barriers. Generally noise at the boundary of the plant shall be controlled so as not to exceed 65dB(A).

Control of Water Quality

Wastewater generally would be generated from washing of trucks and storage bins and also sewage. However sewage could be treated through the central sewerage system. The wastewater should be disinfected with germicide and biodegradable detergents to prevent pollution of the watercourse.

Disposal of Ash

The ash and other residues comprising mainly deformed metallic such as blades, scalpel and needles from the incinerator are to render harmless before final disposal. These wastes are also classified as scheduled wastes and have to be



managed as stipulated in the Environmental Quality (Scheduled Wastes) Regulations 1989. However if it can be proven that the ash and residue are inert it can be considered for disposal in the sanitary landfill.

Monitoring

The need for environmental monitoring and audit especially in EIA cases is never over emphasized. It is useful in enhancing the effectiveness of the EIA system by reviewing how the predictions and the recommended mitigation measures actually work in reality, and what needs to be done to rectify the deficiencies. Other than ambient quality monitoring, the operators are also required to monitor emissions from the stack. Stack sampling are normally required to be carried out every quarter, however for dioxin, the Department has stipulated that it be carried out twice a year. River water quality both upstream and downstream, of the project site shall be carried out regularly during construction of the project. Air quality, noise and vibration should also be monitored. Monitoring shall be carried out by a competent person and reports submitted to the Department of Environment on a regular basis.

STATUS OF COMPLIANCE

Of the eleven clinical waste incinerators licensed by the Department of Environment, three are regional incinerators and the rest old incinerators sited in hospitals mainly in Sarawak and Sabah. From the enforcement visits and emissions testing conducted all incinerators are able to meet the standards set.

One issue that has been raised is the predetermined date for the stack testing of dioxins that some quarter claim does not reflect the true operational condition as they are pre-set. However this is the best option available as it is not possible as yet to measure dioxin on a continuous basis.

WASTE MINIMIZATION

The Environmental Quality (Scheduled Wastes) Regulations 1989 requires the generator to minimize the quantity of waste generated through the best practical means. Generally waste minimization is the reduction to the extent possible of hazardous waste that is generated, treated, stored or disposed. The benefits of waste minimization are:

- ① Save money through more efficient use of valuable resources and reduced treatment and disposal cost.
- ① Reduce a generator's hazardous waste related financial liabilities.
- ① Pay off tangibly when local residents are confident

that industry is making every effort to handle its wastes responsibly.

In the context of clinical wastes the amount of wastes generated might not be within the control of the hospital authorities but handling and hence the mix of hazardous and non-hazardous waste can be monitored and managed. A mixture of scheduled and non-scheduled waste is classified as scheduled waste. In most hospitals more than 80% of waste is not clinical waste (Tan, H., 2000). It is therefore prudent to segregate the wastes and only clinical wastes are sent for incineration. In addition to cost saving, potential health risk and injuries can be reduced. Here the color-coding system under the clinical waste system practice by the MOH is useful.

CONCLUSION

Incineration of wastes especially scheduled wastes has to be thoroughly planned and the system selected able to meet all environmental requirements to avoid serious threat to public health and safety. The assessment of impacts must be done based on sound scientific principles and real data used in predicting impacts so as to arrive at a meaningful conclusion. Equally important is the operation and maintenance aspect. Monitoring of emissions on regular basis would provide the necessary feedback on the performance of the incinerator and additional mitigation measures implemented if required.

With the implementation of the Clinical Waste Management System by the Ministry of Health it is expected that the final disposal of clinical waste would be done in a more cost-effective manner at the same time complying with all the legal requirements. Minimization of wastes through segregation or change in materials would be a challenge for hospital operators in the overall management system might be useful. The Environmental Quality Act 1974 defines it as a system comprising of an organizational structure with its responsibilities, practices, procedures, processes and resources for implementing and maintaining the system relating to the management of the environment. It is envisaged that with this system in place, the disposal of clinical waste would have minimal impact on the environment.

IMPAK





Use of policy instruments to promote cleaner productions in industrial sectors

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INTRODUCTION

UNEP Industry & Environment in 1989 launched the Cleaner Production concept. The concept is relatively simple and straight forward: make more efficient use of natural resources (materials, energy and water) and minimise waste and emissions at their sources.

“Cleaner Production (CP)” is an effective way to reconcile industrial development and environmental protection or towards achieving environmentally sound industrial development, and to promote the development towards sustainable production and consumption patterns or beyond that, sustainable development. CP is a pro-active or preventive approach. The basic philosophy behind the concept is that it is better to prevent than cure. And, the best place to implement strategies is at the source.

CP is a relatively a new, integrative and preventive, environmental strategy for avoiding, or at least minimising, the environmental impacts from industrial products and services, and the production, distribution and service processes these industrial products and services require (Figure 1).

By definition, CP means *the continuous applications of an integrated preventive environmental strategy to processes, products and services to reduce risks to humans and environment* (UNEP). It is aimed at bringing further improvements in the environmental performance and reduction of the environmental impacts related to production processes, as well as products and services. It can lead to economic as well as environmental benefits. It is achieved by applying *know-how, by improving technology, and by changing attitudes* (UNEP) as exemplified in many CP projects worldwide.

Notwithstanding about the potential benefits and advantages of CP concept and its pollution prevention measures, much of the current thinking and practices on industrial pollution control focuses on what to do with wastes and emissions after they have been created. This is termed as *end-of-pipe approach or solutions* coupled with the imposition of specific emission requirements or limits based on available prac-

ticable control technologies. The goal of CP, which should be the more preferred preventive approach, is to avoid generation of waste in the first place, and to minimise the use of raw materials and energy. In long-term basis, CP is the most cost-effective way to operate processes and to develop and to produce products. The costs of waste and emissions, in addition to negative environmental and health impacts, can be avoided or minimise by applying CP concept from the beginning. CP in production processes. It consists one of the following measures or a combination of them: conserving raw materials, water and energy, eliminating toxic and dangerous raw materials, and reducing the quantity and toxicity of all emissions and wastes at the source during the production process (UNEP). For example, on worldwide basis, much progress has been made in chemical industry to achieve overall reduction of waste per ton of product. This has been accomplished by approaches ranging from improved house-keeping to improved processes and process control, development of new less polluting products as well as more efficient utilisation of byproducts. It is therefore important to build awareness of the economic and environmental benefits of CP as it often results in sufficient cost savings and that the payback period for investment in CP technology may be relatively short.

CLEANER PRODUCTION DEVELOPMENT

There are various contributing factors that may facilitate development/implementation of policy instruments that can provide opportunity for creating regulatory and economic incentives to help promote CP approach. Presumably, initially at least certain policy interventions will be required to facilitate a transition and overcome the inertia thus allowing for necessary changes that will allow further advancement in the adoption of CP technologies. Policies that prevent pollution should be more effective and cheaper in long term than policies that induce the treatment and disposal of wastes that could be avoided.

Factors or drivers that facilitate and encourage CP

- i. Legislation and enforcement of government policy requirements, for example compulsory reduction of emissions



and discharges by direct regulation through permits or licensing conditions, procurement practices, introduction of mandatory Environmental Management System (EMS) and reporting requirements or in fulfillment with international-related agreements as specified to meet the general or specific obligations such as to reduce specific pollutants;

ii. Increased public awareness about the product-related environmental problems or policies leading to consumer demands as related to environmental protection requirements or activities and the need to reduce environmental impacts from the products;

iii. Adoption of self-regulation and voluntary industry initiatives and commitments in implementing CP cost efficient measures, for example by changing to non-toxic input material or less harmful process or less polluting technology and savings in energy usage for improved environmental performance of the operation;

iv. Formulation of selective policy instruments or specific effective incentives for change that promote or favouring CP instead of end-of-pipe technologies;

v. Availability of funding mechanisms such as the establishment of special purpose funds for financing CP investments or providing incentives for change towards CP solutions;

vi. Limited regulatory capacity of the enforcement agencies;

vii. CP incentives can be driven, for instance, by a policy decision such as the need for general reductions of pollution potential loads from specific industrial sectors due to its greater share of the total pollution level or resulted from public pressure on industries to reduce their discharges.

CP Approach - Technology and CP

Approaches to CP can be grouped into three categories, namely:

- a. Level I - *reduce waste at source* through good housekeeping, process modification, product and change of materials;
- b. Level II - *recycling of waste* by internal recycling and/or external recycling;
- c. Level III - *use of renewable resources* i.e. the use of biomass as a renewable feedstock for energy, fuels and chemicals and/or using other sources of renewable energy - solar, wind, tidal, small-scale hydroelectric.

The assessment and selection of optimal CP approach de-

pends on the optimum combination of technology (processes and tools) and techniques (how the technology is used).

PROMOTION OF CLEANER PRODUCTION

It is suggested that long-term shifts to CP by industry will require relevant enterprises to promote the process transfer, adaptation and adoption of cleaner technologies. The technological options may range from easier to implement house-keeping measure, input material change and better process control to "hard" technology options - equipment/hardware modification/replacement and change of process technology. CP adoption also depends on the level of environmental legislation and its enforcement, the cost of materials and energy and the cost of management and disposal of waste.

The OECD has suggested three inter-related macroeconomic driving forces for cleaner products and processes - market demand, technological advances and governmental policy to advance adoption of CP by industry. Market forces and change in consumer demands can play strong roles in influencing industry to embark on CP initiatives i.e. to implement changes in the manufacturing processes or feedstocks, modification of the product or adopting/developing new technology or technology innovation. For example, through process improvements can increase the efficiency of converting raw materials into final product and decrease the amount of waste produced compared to conventional process technologies. Advances in technology will also provide new opportunities and options for incorporating proven CP technologies into industrial production. Government policies can enhance development and industrial use of cleaner technologies through various means such as legislation, regulation, guidelines, standards, government procurement, government support for R&D, education/training, information dissemination, incentive scheme to encourage and promote the use of CP by industry.

Importance of CP Policy Initiatives

- i. To allow more widespread practical application of cleaner production i.e. to move forward from limited individual case studies and demonstrations towards broad-based implementation of CP principles;
- ii. To incorporate CP methodology and approach into existing policies, regulations and practices;
- iii. To encourage in-plant cleaner production assessment and use of preferred best management practices for environmental improvements of industries such as in the areas of waste water reduction and energy efficiency;
- iv. Incorporation of CP within the EMS service or produc-

tivity improvement options and/or other aspects such as energy efficiency, health and safety, quality, industrial management systems;

v. Creation of a market demand or opportunities for CP products and services;

vi. Formulation of *action plan* or the promotion of CP as part of the long-term overall strategy to encourage, facilitate and co-ordinate implementation of CP practices or options including waste minimisation and related activities including training, awareness raising and information dissemination;

vii. Development and implementation of relevant economic instruments;

viii. To facilitate transfer of *technology and know-how* for minimisation of industrial pollution for improved environmental performance;

ix. Development of institutional mechanisms responsible for and are capable of developing and implementing CP programmes and plans;

Constraints

i. Difficulty in transferring theory into practice or practical implementation of CP - proving that preventive approach and CP is an efficient way of achieving environmental improvements and the evidence must be abundant and convincing;

ii. Lack of awareness of the potential for preventive actions or process oriented CP approach in various industries as compared to the *end-of-pipe* technologies and their applications;

iii. Lack of financing or financial supports - it has been recognised that lack of investment funds for cleaner technology restrains the move towards CP. CP application can also mean additional investment. Hence, there is a need to establish revolving funds or similar instruments that would focus on financing investments in cleaner technology;

iv. Lack of industry-support mechanisms to encourage CP adoption. Thus, greater commitment and promotional efforts need to be initiated and sustained;

v. Preference over the established or traditional *end-of-pipe* solutions.

CLEANER PRODUCTION POLICY INITIATIVES

Development of *cleaner production policy initiatives* or in-

struments will necessarily help to pave the way and create the conditions or provides mechanisms towards more widespread adoption of cleaner production concepts in the various sector-specific industrial-manufacturing practices. There is an obvious need for an overall strategy to establish a CP program and developing strategies and policy instruments for promoting CP. A strategy is a plan for achieving specified objectives. It basically sets out the broad guidelines to apply the principles of CP that will determine the framework of an action plan and setting priority to implement the CP strategy.

As shown in Figure II, it has been suggested that there are three (3) broad categories of policy instruments, viz.;

- i. *Regulatory* (administrative or directive based) instruments
 - imposing legal control, prescribed limits over the regulated activities;
- ii. *Market-based or economic* (incentive or disincentive-based) instruments
 - creating or adjusting positive or negative financial conditions governing or stimulating the activities;
- iii. *Informative* (information-based) instruments
 - linking or giving information to increase knowledge, awareness and understanding about the activities;

The activities that support the efforts of industry to adopt CP approach

i. Development and implementation of national CP programmes and comprehensive plan to promote CP including identification of specific action items that must be accomplished to implement the strategy;

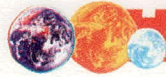
ii. Establish long-term commitment to CP and introduction of administrative mechanisms for promoting and implementing the CP concept;

iii. Encourage the use of in-plant CP assessment methodology and adoption of CP to bring about improvements in the product and service areas and production process in industrial facilities;

iv. Encourage CP investments beyond current demonstration projects or activities;

v. Encourage capacity building in technology transfer, adaptation and adoption;

vi. Promote Research and Development (R&D) into cleaner alternative technologies;



vii. Facilitate the adoption/adaptation and transfer of CP technologies;

viii. Networking, dissemination and exchange of information;

Overall, a very important motivator that can significantly support the promotion of CP is to upgrade the capacity to adopt/adapt CP principles. Thus, the need for the various relevant parties or stakeholders to undertake the capacity-building role in the areas of *awareness raising and training activities such as through the launching of demonstration projects or other practical examples, technical assistance in the application of methodological tools used to identify and assess cleaner production options, information collection, exchange and dissemination on a continuous basis about the CP concept and its real, quantifiable benefits - both economic - by reducing the costs and environmental - by reducing the releases of pollution and waste, the needed financing and investments in cleaner technologies and developments as well as economic incentives, the required CP policy initiatives or introducing policy changes to promote CP.*

CONCLUSION

For the purposes of CP promotion, it is generally acknowledged that whatever form of non-regulatory approaches taken, they are not an alternative to conventional regulation. Rather, they should be viewed as an additional management tool for policy makers, which is complementary to traditional or regulatory approach.

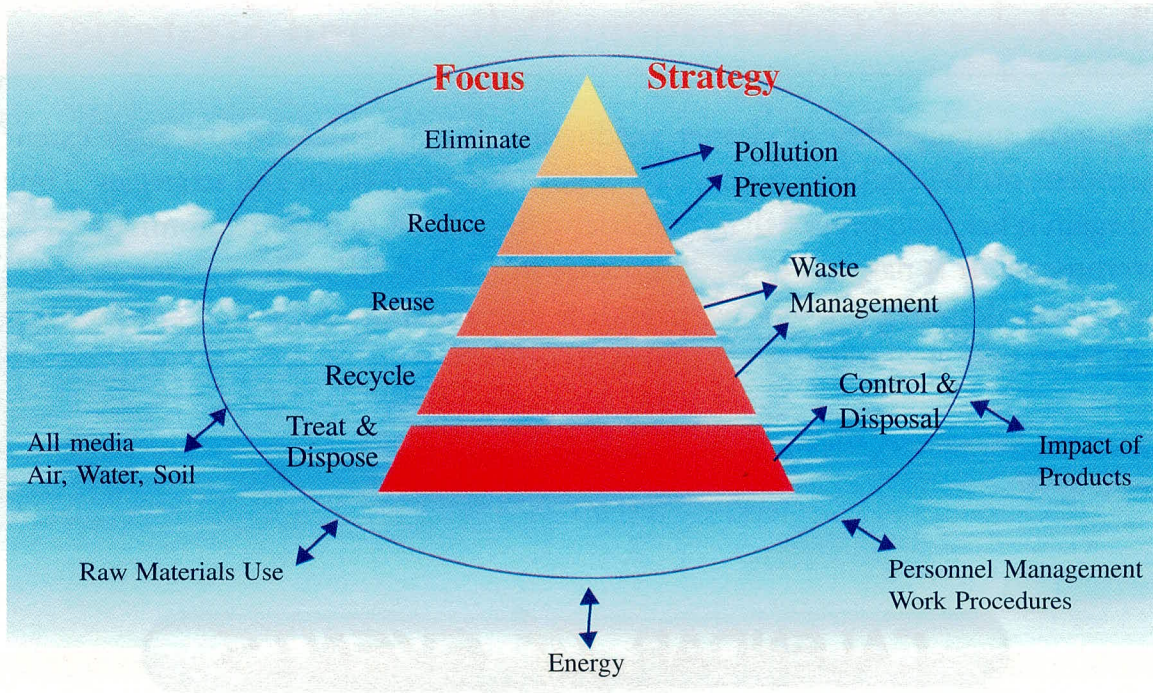
As a complimentary to the existing “*command-and-control*” regulatory based scheme of industrial pollution control and prevention, there is the need to promote the widespread adoption of the principles of Cleaner Production (CP) in the country. Further efforts should also be directed to developing/implementing associated supporting activities related to CP such as training and capacity-building efforts, providing technical support, networking and co-operation with other interested institutions and certain focuses on the collection of information on CP. Initiatives must be made to widely disseminate of relevant information regarding the techniques, opportunities and benefits of CP including waste minimisation can contribute towards promoting CP.

The importance of developing strategies and policies and/or other enabling measures to adopt and implement preventive environmental approach to pollution reduction through cleaner production has been acknowledged. A range of complementary policy instruments may be required to promote cleaner production including the need to develop incentive-based directives or specific policies to encourage CP or change in environmental laws/policies to reduce the barriers but helps to foster the adoption of cleaner production. As a prerequisite, it will also support any initiatives towards introduction of *policy instruments* that will help financing cleaner production. All these efforts are needed in order to eventually achieve significant trend towards cleaner production in industry sectors or at least provide a comprehensive policy framework and action plan or undertakings relating to the promotion of CP practices and environmental improvements. Nevertheless, technology development and advancement, market forces and government policies are together needed and can contribute, facilitate and intensify concerted action towards CP application or adoption by industry.



Governments, business, organisations and consumers all have their roles to play in addressing and advancing CP initiatives or movement.

Figure I: Cleaner Production - An Integrated Approach



Range of Instruments for Environmental Policy

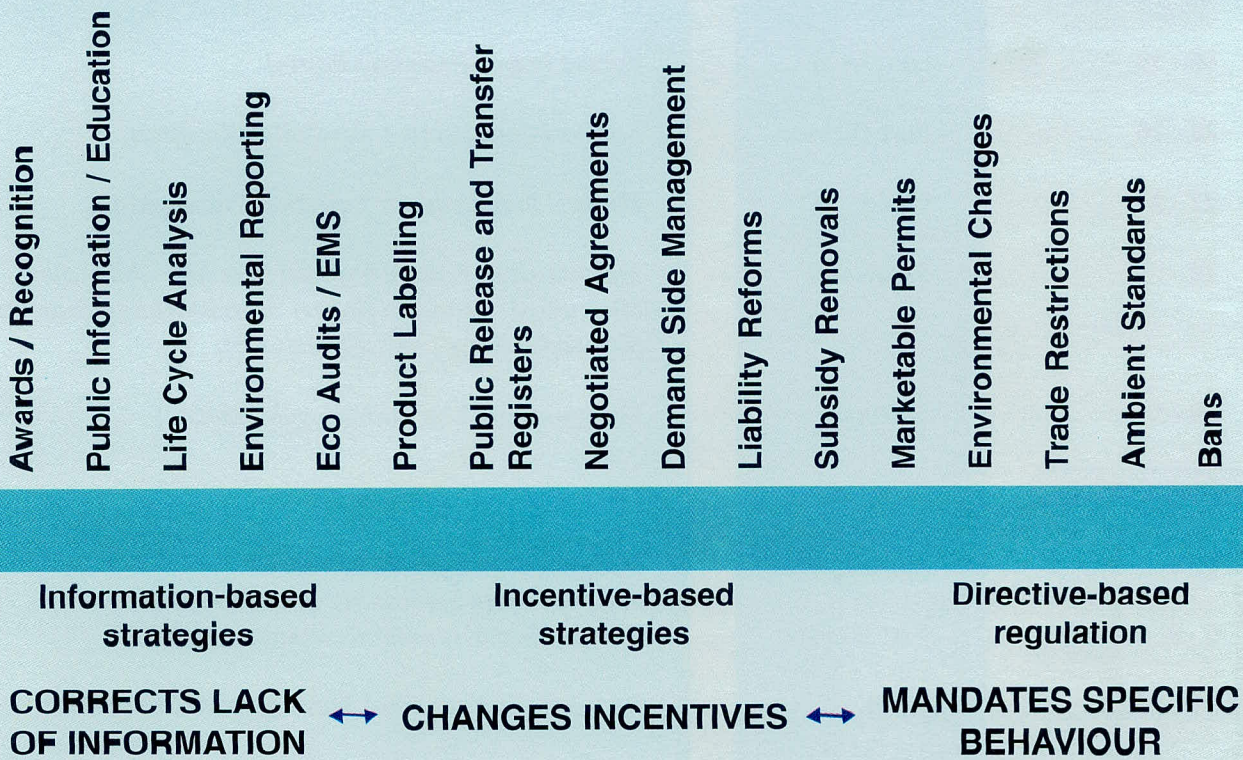


Figure II: Range of Policy Instruments



The Roles of Government Policies and Strategies

Long-term sustainability of cleaner production (CP) practices is to a large extent dependent on the enabling framework of government policies and strategies. Time and again it has been proven that industries respond best to policies promulgated by governments. It is naive to expect industries to take on CP without support at the Policy level, despite a win-win scenario. It is therefore imperative that governments at all levels take appropriate steps to create such a framework.

UNEP's 6th International High-Level Seminar on Cleaner Production, Montreal, Canada, 15-17 October 2000

CALENDAR *of* EVENTS

Date

Place

Events

October

16 - 19

Langkawi

Kursus Impak Pesisiran Pantai

23 - 26

Port Dickson

Kursus Pengurusan + Perolehan Kerajaan

22 - 27

IKLAS

Kursus 'Industrial Air Pollution Engineering'

29

Sarawak

Mesyuarat Di Antara Menteri Dan Ahli-ahli Majlis Mesyuarat Kerajaan Negeri Yang Bertanggungjawab Mengenai Alam Sekitar (MEXCOE).

29 - 5

Sarawak

Minggu Alam Sekitar Malaysia (MASM)

November

5 - 6

Putrajaya

Mesyuarat Pengarah-Pengarah Jabatan Alam Sekitar Bil. 3/2001

5 - 9

Port Dickson

Kursus 'Social Impact Assessment (SIA)'

12 - 13

IKLAS

Bengkel 'Environment Management Plan (EMP)'

12

Putrajaya

Pameran Hari 'Q' Sempena Sambutan Hari 'Q' Kementerian.