

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) GUIDANCE DOCUMENT

FOR THE CONSTRUCTION OF SCHEDULED WASTE RECOVERY PLANT (OFF-SITE).

INTRODUCTION

1. This TOR is prepared as a guidance to the project proponents and environmental consultants in appreciating the procedures and needs in the planning stage for scheduled wastes off-site recovery facilities.
2. This document is also intended to complement other guidance given in the following guidelines where terms and procedures are defined:-
 - a. A Handbook of Environmental Impact Assessment Guidelines;
 - b. Guidelines for the Siting and Zoning of Industries;
 - c. Environmental Impact Assessment Guidelines for Toxic and Hazardous Waste Treatment and Disposal Projects;
 - d. Environmental Impact Assessment Guidelines for Chemical Industrial Projects; and
 - e. Environmental Impact Assessment Guidelines for Risk Assessment.

BACKGROUND

3. The construction of **scheduled waste recovery plant (off-site)** is subjected to the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order, 1987 under “Activity 18(a)(ii): Construction of scheduled wastes recovery plant (off-site)”. Any person who intends to carry out this activity is required to submit a report on the environmental impact assessment to the Director General of Environment for consideration, as mentioned under Section 34A of the Environmental Quality Act, 1974 (Amendment) 1996.
4. Note that scheduled wastes recovered and treated by an industry/waste generator **on-site** do not require separate EIA or licensing from the Department of Environment. It is however prudent for involved parties to correspond with the Department of Environment to establish whether the form and efficiency of such treatment and recovery processes comply with stipulated regulatory levels.

5. According to the Environmental Quality Act, 1974 (Amendment) 1996, “scheduled wastes” means any waste prescribed by the Minister in the regulations as scheduled wastes. Scientifically, scheduled waste is a material or article containing a chemical, or mixture of chemicals, exceeding the threshold concentration and threshold quantity which is produced from certain activities such as industrial, medical, service, containing organic in nature, resistant to degradation by chemical, physical or biological means, toxic to humans, animals, vegetation or aquatic life and bioaccumulative in humans, flora and fauna.

RECOVERY PROCESSES

6. A scheduled wastes recovery plant is a facility that recovers any type of material or substance, from scheduled wastes, by chemical or physical processes. Off-site recovery facilities are defined as premises occupied or used for the retrieval of material or product from any scheduled waste which is not produced on those premises.

7. Recovery can offer a number of environmental in terms of reducing the volume of scheduled wastes that needs to be finally disposed; and economic benefits in generating valuable materials which can be reused when undertaken in an environmentally sound manner.

8. The extraction and recovery of re-usable chemical and physical components, contained mainly in industrial wastes, are generally conducted through the means of chemical processes. The state of technology available to operators offer a large number of process options that can be employed to affect recovery for correspondingly large range of materials. Basic processes used for recovery facilities are electrolysis, distillation, extraction, solvation, smelting, chemical stripping, etc.

9. Scheduled wastes which may undergo recovery processes include spent organic solvents; spent aqueous alkaline/ acidic solutions; sludge, dust, slag and dross; photographic solutions; mineral oil wastes, electrical and electronic wastes, lead acid batteries.

10. Due to the sensitivity of the project and significant polluting potential from the operations, proposal for lead acid batteries recovery have been required to go through the Detailed EIA Procedures which involves public participation and panel experts review.

SUMMARY OF RELEVANT ENVIRONMENTAL REGULATIONS

11. The Environmental Quality Act 1974 and its accompanying regulations call for environmental impact assessment, pollution control assessment, monitoring and self-enforcement. In addition to the requirement for an EIA for prescribed activities, various provisions under specific regulations relating to scheduled waste recovery are as below:-

A. Written Permission

Any person intending to carry out activities as listed below must obtain prior written permission from the Director-General of Environmental Quality:

- i. Construction of any building or carrying out of any work that may result in a new source of effluent or discharge as stipulated under Regulation 4, Environmental Quality (Sewage and Industrial Effluents) Regulations 1979;*
- ii. Construction on any land or any building; or carrying out work that would cause the land or building to become prescribed premises (crude palm oil mills, raw natural rubber processing mills, and treatment and disposal facilities of scheduled wastes), as stipulated under Section 19 of the Environmental Quality Act, 1974.*

** Such application has to be accompanied by a prescribed fee.*

B. Written approval

Applicants intending to carry out activities as listed below shall obtain prior written approval from the Director-General of Environment Quality:

- i. New installation near dwelling area as detailed out in Regulation 4 and First Schedule of the Environmental Quality (Clean Air) Regulations 1978.*
- ii. Any erection (including incinerators), installation, resiting or alteration of fuel burning equipment that is rated to consume pulverised fuel or solid fuel at 30 kg or more per hour, or liquid or gaseous fuel at 15 kg or more per hour as stipulated in*

Regulations 36 and 38 of the Environmental Quality (Clean Air) Regulations 1978.

- iii. *Any erection, installation, resiting, or alteration of any chimney from or through which air impurities may be emitted or discharged, respectively.*

** No fee imposed for the application of written approval.*

C. Gaseous Emission And Effluent Standards

*Facilities are required to comply with both air emission and effluent discharge standards which are regarded as acceptable conditions allowed in Malaysia, as stipulated in the Environmental Quality (Clean Air) Regulations 1978 and the Environmental Quality (Sewage and Industrial Effluents) Regulations 1979. Air emission and effluent discharge standards are as per **Appendix 1** and **2** respectively.*

D. Control On Ozone Depleting Substances

Ozone Depleting Substances (ODS) are categorised as environmentally hazardous substances under the Environmental Quality (Refrigerant Management) Regulations 1999 and the Environmental Quality (Halon Management) Regulations 1999. New investments relating to the use of these substances are prohibited.

E. Scheduled Wastes Management

Residues generated from scheduled wastes recovery processes are also classified as scheduled wastes. Hence, the scheduled wastes recovery facility which generates, stores, transports, treats or disposes scheduled waste is subject to the main following regulations:

- i. *Environmental Quality (Scheduled Wastes) Regulations 2005;*
- ii. *Environmental Quality (Prescribed Conveyance)(Scheduled Wastes) Order 2005;*
- iii. *Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Order 1989;*
- iv. *Environmental Quality (Prescribed Premises) (Scheduled Waste Treatment and Disposal Facilities) Regulations 1989;*

- v. *Customs (Prohibition of Export) Order (Amendment)(No. 2) 1993,*
and;
- vi. *Customs (Prohibition of Import) Order (Amendment)(No. 2) 1993.*

SITE SELECTION

12. It is very important and crucial to locate a scheduled wastes recovery facility (off-site), as with all other facilities handling materials of this nature. Site suitability is evaluated based on the compatibility of the project with respect to the gazetted structure or local plans, surrounding land-use, provision of set-backs or buffer zones, the capacity of the area to receive additional pollution load, and waste disposal requirements.

13. Details on the appropriate buffer zone with respect to a specific category of industry can be obtained from "*Guidelines for the Siting and Zoning of Industries*". An outline of the guidelines is given in **Appendix 3**. For potentially hazardous* industries, the project proponent may be required to submit a Risk Assessment to the DOE as part of the site consideration.

- *Hazardous industry: Any industry or installation which has the potential for causing injury threat to health, death, and damage to property or the environment.*

14. Project proponent has to confirm and verify the status of the proposed site with the local authority, taking into consideration the following Department Of Environment's guiding principles/ criteria in site selection for the construction and operation of scheduled waste recovery facility (off-site):

- a. Suitable siting areas:
 - Heavy Industrial Area; or
 - Medium or General Industrial Area:
 - A minimum distance from the fence of the industry to the nearest residential area is 500 meters, to be finalized by the EIA reports.
 - The proposed activity shall have a minimum buffer zone of 250 meters with similar activities (compatible).
- b. Unsuitable siting areas:
 - Light Industrial Area.
 - Sites which are not gazetted as industrial areas.

c. Sites at the upstream of raw water intake points.

- Site location is not advisable.
- However, if the site is unavoidable and chosen by the project proponent, the water quality impacts analysis and proposed mitigating measures have to be studied in detail.

15. Primary impacts associated with scheduled wastes recovery plants are those of the risk associated with the storage, handling and processing of chemically interactive scheduled waste materials, toxic/mal-odorous emission and contaminated wastewater released to the environment. Based on the above factors, industries are advised to locate project activities within gazetted and EIA approved industrial sites. This is to ensure proper planning has been taken into consideration which leads to less environmental problems in the future, especially during operation.

STATEMENT OF NEED

16. The first step is establishing the need for the project. Justification of scheduled wastes recovery projects may involve consideration of factors including:-

- Projections on increasing wastes arising over the project life;
- Current waste treatment/disposal practice, cost and environmental impacts;
- Availability of alternative facilities in the local area;
- Benefits of the proposed scheduled waste recovery projects;
- The no project option.

KEY ISSUES AND SCOPE

17. In preparing an EIA report for scheduled wastes off-site recovery facilities, the project proponent and EIA consultant shall be able to identify key issues related to the activities being proposed. Below are the key issues and information to be made available to the assessor of the EIA report:-

(a) Existing Environment

Detailed explanation on existing environment should be identified and it should be site-specific, taking into consideration the locations of all environmentally sensitive areas/ receptors of special or unique scientific, socio-economic or culture value, within 5 km radius. All the critical

issues related or affected from the activity should be clarified. Detailed descriptions are needed.

For proposed sites located within gazetted and EIA approved industrial area, the explanation and description on the existing environment shall cover the existing air quality conditions at the industrial site and noise level conditions.

(b) Project Description

Detailed description of a selected project option or a detailed description of the project concept should be given, among others:-

- Description of the project with supporting technical data available.
- Clear maps and diagrams of the concept of the proposed project.
- A summary of the technical, economic and environmental features essential to the project.

(c) Layout Plan

Complete layout plan should be given as follows:

- Reception area with weighbridge and laboratory unit for sampling purposes.
- Special wastes reception area and adjacent storage area.
- Recovery plant buildings, machinery, and related infrastructure.
- Truck cleaning area.
- Bund walls and drainage systems isolating handling/storage/cleaning and operational areas.
- Emergency on-site storage pond for liquid wastes.
- Lined storm water retention pond/ storm water system as a contingency for excessive runoff from contaminated areas.
- Floor linings of adequate design, incorporating a surface concrete layer, usually underlying a sand layer and a final PVC layer.
- Roofing of potentially contaminated areas and storage areas with separate drainage.
- Processing/Recovery systems.
- Wastewater treatment systems.

- Ventilation systems.
- Fire-fighting system, sprinkler systems and facilities.
- Security fencing, boundary fencing and controlled access.

(d) Physical and Chemical Conditions of Scheduled Wastes

To identify the suitable scheduled wastes for recovery purposes, there must be a complete explanation on the description of scheduled waste, as follows:

- Source, type and categories of scheduled waste and also the process involved in the generation of the scheduled wastes; and
- Chemical composition analysis of scheduled waste contains heavy metals (weight/ dry-weight) and other pollutants such as sulfur, benzene, etc.

(e) Waste Acceptance Criteria

Project proponent has to prepare the “Waste Acceptance Criteria” (WAC) document for each types of scheduled wastes which are to be recovered. The WAC contains the level of pollutants (impurities) in the scheduled wastes that can be accepted in the recovery process, as well as the level/percentage of precious metals that can be economically recovered.

(f) Recovery Process Technology

Detailed explanation on the concept of selected recovery process including the criteria involved and the maximum capacity should be given in the report. Project proponent may also produce track record data of similar plant that is in operation.

(g) Mass Balance Calculation

Every single process should be attached with mass balance calculations which means the quantification of total materials into and out of a process with the difference between inputs and outputs being accounted for as a release to the environment or as part of the facility's waste.

(h) Final Product

There must be a viable on-going market for the products of recovery operations. The recovered products must have a legitimate use. Product specification must be outlined and compared with other countries such as US and Europe or Basel Convention. Please refer to Hazardous Materials Division, DOE.

(i) Potential Significant Impacts

The environmental parameters of particular concern that can be adversely affected with regard to off-site recovery plants for toxic and hazardous wastes are summarized below. An EIA covering such development will focus on investigating, analyzing and assessing these significant environmental impacts and any site specific issues associated with particular projects.

- Air Quality: Impacts to the environment from the release of toxic vapours, noxious and mal-odorous emissions and potentially hazardous release of toxins, trace metals, sulphur and nitrogen oxides, and other pollutants.
- Water quality: Impacts to the environment from the discharge of waste water from various sources ie. process area, floor washing, truck washing, wet scrubber, etc.
- Risks : explosion/catastrophe, health, transport and traffic and chemical reactions.
- Public and Operator health and safety.
- Accidental spills and leakages;
- Noise emissions;
- Management of scheduled wastes;
- Transportation of raw materials and products;

Each key issue should be addressed in terms of predicted impacts, proposed mitigation and residual impacts. Rate each key issue by magnitude and duration.

Predictions of impacts are normally based on commonly used methodologies and models. The significance of the predicted

adverse impacts can be evaluated based on one or more of the following:

- comparison of laws, regulations or accepted national or international standards
- consistency with the pre-set policy objects (such as land use, economic development, and others)

(j) Pollution Control – Mitigation and Abatement Measures

Mitigation of impacts is the stage to determine possible preventative, remedial or compensatory measures for each of the adverse impacts evaluated as significant. Mitigation measures shall take into account, but not limited to, the following:

- adequate buffer zones;
- adequate air pollution controls, and comprehensive wastewater treatment systems;
- need for separate drainage systems for spillage;
- storage and handling of raw materials and products;
- alternative process technology and raw materials which are safer and more environment friendly;
- minimization of wastes e.g by closed loop processing;

Mitigation measures should be described and mapped for each adverse impact, according to specifications and location. Mitigation should be specific to the impact and linked to the activity by schedule of occurrence.

Commitments from project proponents to adopt significant pollution control equipment can reduce negative impacts on environment. All the design measures which have been adopted into the project plan should be discussed in the EIA report. The pollution control technology chosen by the project proponent must be able to meet the relevant emission standards stipulated under the Environmental Quality Act, 1974 and other subsequent guidelines ie. Recommended Ambient Air Quality Standards as well as other related standards.

The Emergency Response Plan (ERP) will be prepared by the proponent or his operator prior to start-up of the facility. In essence, the risk assessment report should provide an outline

ERP indicating all issues that must be addressed by the ERP itself and specify minimum levels of safety provisions needed at the facility. Person involved in the recovery of hazardous wastes must be capable and adequately trained.

(k) Residual Impacts

Potential environmental impacts may remain after mitigating measures have been adapted in to a project plan. These are described as residual impacts which generally require further studies during the detailed assessment stage. The residual wastes produced from the recovery process shall be disposed at the Central Waste Treatment and Disposal Facility, licensed from DOE. The residual waste cannot be recovered at all.

(l) Monitoring

The project proponent should describe the monitoring program needed which includes the monitoring program for ambient air quality, gas and hazardous emissions from the stacks, sewage (effluent), noise, scheduled waste analysis plan and products must be taken into account including the objective, target and compliance with applicable regulations.

CONCLUSIONS

18. In conclusions, the important elements on recovery of Scheduled Waste (off-site) activity are:

- The comprehensive information on the process and technology proposed.
- The main focuses are on the critical issues related to activities involved.
- Potential significant impacts including the based guidelines simulation model, emergency response analysis, mitigating measures, monitoring program, etc.
- The cumulative impact must be taking into account if the application of recovery process involves more than one type of scheduled waste.
- Complete waste acceptance criteria calculation.
- Compliance with applicable regulations.

Appendix 1

STACK GAS EMISSION STANDARDS

[EXTRACT FROM ENVIRONMENT QUALITY (CLEAN AIR) REGULATIONS 1978]

Pollution	Emission Sources	Standards
1. Dark Smoke*	1.1 Solid Fuel Equipment or Facilities 1.2 Equipment using other types of fuel	Ringelmann Chart No. 2 Ringelmann Chart No. 1
2. Dust	2.1 Facilities used for the heating of metal other than Cold Blast Foundry Cupola 2.2 Facilities discharging dust containing asbestos and free silica 2.3 Portland Cement Manufacturing: a) Kiln b) Clinker, cooler, grinder, others 2.4 Asphalt concrete/bituminous mixing plant: a) # Stationary Plant b) # Mobile Plant 2.5 Other source	0.2 gm/Nm ³ 0.12 gm/Nm ³ 0.2 gm/Nm ³ 0.1 gm/Nm ³ 0.3 gm/NM ³ 0.4 gm/Nm ³ 0.4 gm/Nm ³
3. Metal and Metallic Compound		

Pollution	Emission Sources	Standards
3.1. Mercury	Industry	0.01 gm/Nm ³
3.2. Cadmium	Industry	0.015 gm/Nm ³
3.3. Lead	Industry	0.025 gm/Nm ³
3.4. Antimony	Industry	0.025 gm/Nm ³
3.5. Arsenic	Industry	0.025 gm/Nm ³
3.6. Zinc	Industry	0.1 gm/Nm ³
3.7. Copper	Industry	0.1 gm/Nm ³
4. Gases		
(a) Acid gases	Sulphuric Acid Manufacturing.	3.5 gm of SO ₃ /Nm ³ and no persistent mist
(b) Sulphuric Acid Mist or SO ₃ or both	Any Sources other than (a)	0.2 gm of SO ₃ /Nm ³ and no persistent mist
(c) Chlorine gas	Any source	0.2 gm of HCL/Nm ³
(d) HCl	Any source	0.4 gm of HCL/Nm ³
(e) Fluorine, Hydrofluoric acid, inorganic fluorine compound	Aluminium Manufacturing From Alumina	0.02 gm of Hydrofluoric acid/ Nm ³
(f) - do -		
(g) Hydrogen Sulphide	Any source other than (e)	0.10 gm of Hydrofluoric acid/ Nm ³ 5 ppm (Vol%)
(h) NO _x	Any source	
(i) NO _x	Acid Nitric Manufacturing	1.7 gm of SO ₃ /Nm ³ and Substantially Colourless

Pollution	Emission Sources	Standards
	Any source other than (h)	2.0 gm SO ₃ /Nm ³

- * Allowable to exceed both standards not longer than 5 minutes in any period of one hour and 15 minutes in any period of 24 hours.

Appendix 2

PARAMETER LIMITS OF EFFLUENT OF STANDARDS A AND B THIRD SCHEDULE, ENVIRONMENTAL QUALITY (SEWAGE AND INDUSTRIAL EFFLUENTS) REGULATIONS, 1979.

Parameter	Unit	Standard	
		*A	B
a) Temperature	°C	40	40
b) pH Value	-	6.0-9.0	5.5-9.0
c) BOD ₅ or 20°C	mg/l	20	50
d) COD	mg/l	50	100
e) Suspended Solids	mg/l	50	100
f) Mercury	mg/l	0.005	0.05
g) Cadmium	mg/l	0.01	0.02
h) Chromium, Hexavalent	mg/l	0.05	0.05
i) Arsenic	mg/l	0.05	0.10
j) Cyanide	mg/l	0.05	0.10
k) Lead	mg/l	0.10	0.5
l) Chromium, Trivalent	mg/l	0.20	1.0
m) Copper	mg/l	0.20	1.0
n) Manganese	mg/l	0.20	1.0
o) Nickel	mg/l	0.20	1.0
p) Tin	mg/l	0.20	1.0
q) Zinc	mg/l	2.0	2.0
r) Boron	mg/l	1.0	4.0
s) Iron (Fe)	mg/l	1.0	5.0
t) Phenol	mg/l	0.001	1.0
u) Free Chlorine	mg/l	1.0	2.0
v) Sulphide	mg/l	0.50	0.50
w) Oil and Grease		Not Detectable	10.0

* *This standard applies to the industrial and development projects which are located within catchment areas (areas upstream of surface or above sub-surface water supply intakes, for the purpose of human consumption including drinking)*

Note

1. To minimise unnecessary pollution control cost, project proponents are advised to avoid siting of their proposed project that generate effluents in areas subject to Standard A. You may refer to the Fourth Schedule of the said Regulations or its latest update on catchment areas where Standard A applies. Otherwise Standard B generally applies.

2. These sets of uniform standards generally apply to both industrial and development projects throughout the country. However, the Environmental Quality Act, 1974 does provide legal provisions for project proponents to vary their standards of emissions or effluents, provided that a licence is obtained from the Director General of Environment. In granting such licence, consideration will be given to some factors such as technology availability and constraints and capacity of the area to receive additional pollution load. It must also be shown that contravention of the acceptable conditions will not cause hazards to public health, wild life, fish or aquatic life, or to plants or to affect adversely any beneficial use of the environment.

Appendix 3

GUIDELINES FOR THE SITING AND ZONING OF INDUSTRIES

TABLE 1: SUMMARY ON THE SITING AND ZONING OF INDUSTRIES

Industries	Descriptions and Standard Requirements	Buffer Zone (distance between industries)
Light Type A	<ul style="list-style-type: none"> ◆ Industries shall not generate excessive noise. ◆ Industries shall not accommodate stacks or chimneys thus producing no gaseous emissions. ◆ Industries shall not discharge industrial effluent apart from sewage and kitchen waters and non-toxic solid wastes. ◆ Industries shall not use any raw materials which are toxic and hazardous and therefore will not produce any scheduled wastes. ◆ Industries shall have height restrictions determined by the Local Authority. ◆ Industries shall use electricity and gas as fuels. ◆ Industries shall not use any radioactive material and scheduled wastes. <p style="text-align: center;"><i>Note: Light industries (Type A) shall not produce any industrial emissions and significant discharges.</i></p>	30 m
Light B	<ul style="list-style-type: none"> ◆ Industries shall not generate excessive noise. ◆ Industries shall not accommodate stacks or chimneys thus producing no gaseous emissions. ◆ Industries shall not use any raw materials or produce any scheduled wastes. ◆ Industries shall have height restrictions determined by the Local Authority. ◆ Industries shall produce industrial effluent that can be treated on site before being discharged to meet Standard A or B of the Environmental Quality (Sewage and Industrial Effluent) Regulation 1979 depending on the site. ◆ Compatibility in industrial mixing, eg. between food based 	50 m

Industries	Descriptions and Standard Requirements	Buffer Zone (distance between industries)
	<p>industries and leather-based industries.</p> <ul style="list-style-type: none"> ◆ Industries shall not use any radioactive materials or scheduled wastes. <p><i>Note: Industrial Effluent discharge and gaseous emissions shall meet the relevant Environmental Quality Regulations as stipulated in the Environmental Quality Act, 1974.</i></p>	
Medium	<ul style="list-style-type: none"> ◆ These industries could generate significant noise from machineries, generators etc but which could be controlled to meet the level not exceeding 65dB (A) Leq at the factory boundary, and not exceeding 55 and 45 dB(A) Leq at the residential/buffer zone boundary during day and night time respectively. ◆ Industries could emit some gaseous emission but which can be controlled to comply with the Environmental Quality (Clean Air) Regulation 1978. ◆ The industries could produce some industrial effluent that can be treated on site before being discharged to meet the Environmental Quality (Sewage and Industrial Effluent) Regulation 1979, standard A or B depending on the site. ◆ These industries could use toxic and hazardous raw materials in its productions. ◆ The industries could produce scheduled wastes but which can be treated on site to comply with the Environment Quality (Scheduled Wastes) Regulation 1989 or disposed off from their premises. ◆ These industries could produce fumes and odors that can possibly affect the workers health and the neighbouring plant, but for which design solutions are available for prevention and shall comply with the Environment Quality (Clean Air) Regulation 1978. ◆ The stack height shall conform to the production capacity of the specific plant to be based on air quality modeling and simulation with the DOE approval. ◆ The industries shall be located in designated industrial estates or zones with good compatibility within the industrial estates and zones to ensure good industrial mixing. 	250 m

Industries	Descriptions and Standard Requirements	Buffer Zone (distance between industries)
	<ul style="list-style-type: none"> ◆ These industries shall not use any radioactive materials. <p style="margin-left: 40px;"><i>Note: All discharges and emissions shall meet the relevant Environmental Quality Regulations stipulated in the Environmental Quality Act, 1974.</i></p>	
Heavy	<ul style="list-style-type: none"> ◆ Heavy industries must be sited in designated industrial estates or designated industrial zones with sufficient buffer zones from residential areas, livestock farm, agricultural farms, recreation areas and tourist designated areas. A minimum distance from the fence of the industry to the nearest residential area is 500 meters, to be finalised by the EIA Report. ◆ These industries could generate excessive noise from its operations but for which design solutions are incorporated in the form of appropriate high technologies to reduce the noise level generated to a level to meet the WHO recommended level of not greater than 65 dB(A) at the factory boundary and not exceeding 55 and 45 dB(A) at the residential/buffer zone boundary during day and night time respectively. ◆ These industries could produce gaseous emissions at rates, volumes and concentrations that will require detailed engineering design incorporated into the operation and control mechanisms and other mitigation measures to reduce these emissions to comply with the Environmental Quality (Clean Air) Regulation 1978. ◆ Stack heights shall be determined by detailed air quality modelling and simulations within the EIA Report. ◆ These industries could produce industrial effluent at rates, volumes and concentrations that will require detailed engineering design incorporated into the operation and control mechanisms to meet the Environmental Quality (Sewage and Industrial Effluent) Regulation 1979 and/or to dispose such wastes to the Central Treatment Facilities. ◆ The industries could use radioactive materials and scheduled wastes which are toxic and hazardous for which pollution control technology, design solution and mitigation measures shall meet the necessary approvals. 	500 m

Industries	Descriptions and Standard Requirements	Buffer Zone (distance between industries)
	<ul style="list-style-type: none"> ◆ These industries could generate scheduled wastes which cannot be treated on-site or which exceed the levels recommended in the Environmental Quality (Scheduled Wastes) Regulation 1989. Thus in compliance with the above regulation the industries shall incorporate necessary technologies to reduce the scheduled wastes generation to the acceptable level or they can be disposed for treatment at a centralized scheduled wastes treatment plant, or recycled within its premise, or sold to other parties for the purpose of recycling. ◆ Siting within an industrial estate or zones should take into consideration the compatibility in industrial mixing. ◆ Hot water discharges shall be supported by thermal plume modelling and simulations to be clearly presented in the EIA Report. <p><i>Note: All discharges and emissions shall meet the relevant Environmental Quality Regulations as stipulated in the Environmental Quality Act, 1974 and using appropriate control measures.</i></p>	
Special	<ul style="list-style-type: none"> ◆ Industries that by their process description and plant outputs are involved in the manufacturing of products that are generally accepted as being categorized as high technology based products. ◆ Industries that utilize high/advanced and clean technology in their process and control mechanisms, as verified by EIA documents, and backed up by examples of parent plants or other plants operating elsewhere. ◆ Industries that will eliminate or minimize emissions, wastewater discharges and schedule waste production. ◆ Industries shall be located within designated special industries zones, being compatible with the neighbouring plants, which are designed to be environmentally friendly. <p><i>Note: Near-zero emissions and discharges shall be achieved by incorporating clean technologies.</i></p>	200 m

REFERENCES

1. *Panduan Permohonan Kelulusan Laporan Penilaian Kesan Kepada Alam Sekeliling (EIA) Bagi aktiviti 18a(ii), Perintah Kualiti Alam Sekeliling (Aktiviti yang Ditetapkan)(Penilaian Kesan Kepada Alam Sekeliling) 1987.*
2. *Environmental Impact Assessment Guidelines for Toxic and Hazardous Waste Treatment and Disposal Projects, Department of Environment, February 2000, EG 13/95.*
3. *Draft Technical Guidelines on the Environmentally Sound Recycling /Reclamation of Metal Compounds (R4) Conference of the Parties to the Basel Convention on the Control of Transboundary Movements on Hazardous Wastes and Their Disposal- Seventh Meeting, Geneva, 25-29 October 2004.*
4. *Guidelines for the Siting and Zoning of Industries, Department of Environment, EG11/94.*