



Waste Disposal Ordinance (Cap. 354) **A Guide for Writing Operation Plan** **for Waste Disposal Licence of E-Waste**

Applicants have to submit operation plans together with duly completed forms (Form EPD-236) when making applications for waste disposal licences (WDL) for e-waste under the Waste Disposal Ordinance (WDO). E-waste includes air conditioners, refrigerators, washing machines, television sets, computers, printers, scanners and monitors ¹. Operation plan, after its approval by the Authority, will form an integral part of a WDL, and noncompliance with WDL is a serious offence.

2. These guidelines outline the contents of a typical operation plan and include some operational examples, aiming at helping the applicant to write up his operation plan. However, applicant is always free to use his own style of presentation and not necessarily follow these guidelines as long as details of the operation are adequately covered to the satisfaction of the Authority. It is the responsibility of the applicant to produce a proper and acceptable plan reflecting his actual operation.

Purposes of the operation plan

3. An operation plan for a waste disposal facility sets out the details of e-waste storage, treatment, reprocessing and recycling operations, the planning and management of the associated environmental and safety issues from e-waste reception to final disposal within the facility. It details how the facility will be properly operated to ensure that the e-waste can be treated and recycled in an environmentally sound manner to protect the environment and safeguard public health. Before submission of an operation plan, the applicant should critically review whether his operation is up to the requirements.

Aspects to be covered

4. An operation plan should be clear with sufficient details to cover the various essential aspects of the operation, including those mentioned in the following paragraphs. The applicant should engage technically competent persons either within his company or hired outside to check the proposed operation plan. The plan should cover 12 aspects as specified as 5(a) to (l) under “Part 6. Supplementary Information” on the application form i.e. EPD-236. The relevant information and details for each aspect are provided below. Maps (drawn to the metric scales of not less than 1:100), drawings (e.g. floor plans), flowcharts and photos should be included as appropriate. Every plan should be drawn in one whole piece, and not blurred.

¹ E-waste is defined as any electrical equipment or electronic equipment that, judging by its appearance is an item set out in column 2 of Schedule 6 to the Product Eco-responsibility Ordinance (Cap 603) and has been abandoned.

(a) Site engineering works and infrastructure

a.1 Include a location plan of the facility/premises, with marking of its site boundary, any nearby sensitive receivers that may potentially be affected by operations of the facility, and its corresponding land use zoning(s) on statutory plan(s) under the Town Planning Ordinance. Sensitive receivers include residential buildings, schools, hospitals, places of public worship, performing arts centres, parks etc.

a.2 Include a layout plan of all buildings and structures used for waste storage, treatment, reprocessing and recycling processes within the boundary of the site. The site boundary should also be clearly marked. All buildings and structures should be clearly annotated (such as e-waste reception building, treatment and recycling plants, e-waste storage building, office building). Key parameters such as total site area, sheltered or covered areas, as well as floor areas, dimensions, number of storeys and heights of all buildings and enclosed structures for waste storage, treatment, reprocessing and recycling processes should be indicated. The layout plan should also show access roads, and effluent and stormwater discharge systems for the facility. Sectional drawings should be provided as appropriate.

a.3 Include a layout plan of the areas covering the e-waste reception, transportation, treatment/recycling/disposal of e-waste, with each type of installation and instrumentation (such as treatment components) marked. Information on structures partitioning the areas, exit doors, material(s) used for paving the floor, as well as landscaping (if applicable), should be indicated. Effluent discharge/air emission points, if any, should be shown in the plan. Facilities for handling residues of the treatment and recycling process should also be shown. Information on the material(s) of the walls and roofs of the building structures should be provided.

a.4 Include a layout plan of fire safety installations and equipment. Locations of street fire hydrants for the facility, either within or outside the site boundary, should be shown. Apart from the fire safety installations and equipment [such as street fire hydrant, hose reel system, sprinkler system, fire extinguisher(s), fire alarm system, emergency lighting, directional and exit sign(s)], the locations and size of water tank(s) for street fire hydrant, hose reel system and sprinkler system should also be clearly marked on the plan.

Requirements and points to be noted

a.5 The mechanical plant, machinery, equipment and treatment processes in connection with the e-waste treatment, reprocessing and recycling operation shall all be fully enclosed in a structure with four walls and a roof. The structure shall be designed to withstand rain, sunlight and extreme weather conditions, including storms and typhoons. The layout and settings should not obstruct any emergency escape route.

a.6 For standalone storage area, it should have a roof and be enclosed on at least three sides by a wall, partition or fence with a height of not less than two metres or the total height of e-waste in stack, whichever is less. Suitable materials for the construction of the enclosures include concrete, brick, and steel with protective coating or treatment. The storage method should prevent the release of any harmful material

due to leakage or damage of the e-waste.

a.7 The areas used for the storage, handling, treatment and disposal of e-waste shall be paved with impermeable floor made of suitable material, such as concrete and steel plates, to withstand normal abrasion and chemical action of any e-waste and to avoid land contamination.

a.8 Drainage with adequate capacity shall be provided to prevent the discharge of large quantity of pollutants due to flooding of the site, buildings and operations therein. Where flooding of the area is likely, the floor area should be raised, for example by adopting a raised platform design.

a.9 Installation of surface runoff interceptor and/or sedimentation tank to capture the first flush of the paved open space and/or surface water, for either local treatment or off-site disposal, is required.

a.10 For fire safety requirements, reference should be made to guidelines issued by the Fire Services Department.

(b) The e-waste reception arrangements

b.1 Out of the eight types of e-waste (air conditioners, refrigerators, washing machines, television sets, computers, printers, scanners and monitors), specify which types of e-waste are intended to be received and handled in the facility.

b.2 State the e-waste handling procedures, equipment, receptacles deployed to convey the e-waste received from the reception point to the storage areas. Procedures to deal with the arrival of e-waste not covered by the licence should also be included.

Requirements and points to be noted

b.3 E-waste handling procedures should include registration of delivering vehicles, weighing of e-waste at reception area, subsequent procedures to transfer e-waste, unloading equipment, any manual handling or conveyor belt, etc.

(c) Containers, receptacles and storage areas used for the storage of materials and e-waste to be processed at the facility

c.1 Detail the type, quantity and size of containers, receptacles and storage areas for storing each type of e-waste. Give the location and details (including material and height of partition, ventilation device(s) installed, etc.) of all storage area(s) for e-waste.

Requirements and points to be noted

c.2 Adequate ventilation should be allowed by leaving some space between the top of the enclosure walls and roofed structure, or provision of louvers on the sides of the enclosure walls of storage areas.

c.3 The stacking of e-waste is allowed provided that:

- (i) there are suitable structures, such as enclosure walls or partitions, properly designed cages or receptacles, to ensure safe and stable storage;
- (ii) the stacking of e-waste is made secure so as to prevent falling down of waste or items; and, as a general rule, the maximum height of stacking should be limited to no more than 3 metres, unless proven otherwise; and
- (iii) the storage method shall prevent the release of any harmful material due to e-waste damage and/or leakage.

(d) The operating procedures for the facility including flow diagrams and the recycling rate

d.1 State the design throughput of the plant and the likely e-waste intake pattern (e.g. normally at a certain tonnage each day). The maximum daily and annual handling capacity, treatment processes involved (dismantling, shredding, means of material separation), as well as the recycling rate of each e-waste type (including the types and quantities of recyclable materials produced) and of the whole facility should be provided. The information should include design flow and relevant safety factors etc. Calculations to support that the proposed treatment processes are adequate to treat the e-waste and recycle the e-waste at a recovery rate of no less than 80% by weight should also be included. A maximum storage capacity of e-waste should also be specified.

d.2 Describe the details of operating procedures of all treatment and recycling processes carried out in the facility. Submit a schematic flow diagram with all the treatment components involved. The installations/components should be shown with actual connection to each other indicating the flow from e-waste intake, treatment and recycling, to waste disposal. The flow diagram(s) should be supplemented with details of each component's function.

Requirements and points to be noted

d.3 The recycling rate to be achieved by the operation should not be less than 80% by weight, which should be calculated as follow:

$$\frac{\text{Weight of items/materials generated from the e-waste being reused + recycled + exported}}{\text{Total weight of e-waste received}} \times 100\%$$

Items/materials taken to the Chemical Waste Treatment Centre, landfills or similar facilities for destruction locally or overseas will not be counted as recycling.

d.4 Some operational considerations for specific types of e-waste are highlighted below. In general, parts containing hazardous materials, such as waste printed circuit

boards (PCBs), mercury switches and batteries, should be removed and segregated at the initial steps. These are classified as chemical waste and should be handled, stored and disposed of in accordance with the relevant legal requirements.

(i) Air conditioners

- Sorting of air conditioners according to types of refrigerants used should be conducted to facilitate subsequent handling.
- Refrigerants and compressor oil should be removed without leakage to the environment, and an extraction system should be used for the recovery of refrigerants.
- During the recovery of refrigerants, all hoses should be properly connected and a suitable apparatus with automatic stop function should be used, or a suitable weighing device should be used to monitor the total and increased weights of the container.
- Some types of refrigerants are flammable, such as liquefied petroleum gas (LPG) and ammonia, and corresponding safety precautionary measures should be taken.
- If the refrigerant gas is LPG² defined under Gas Safety Ordinance (Cap. 51), the importation, manufacture, storage, transport, supply and use of the gas shall be controlled under Gas Safety Ordinance (Cap. 51).
- Other than LPG, unwanted refrigerants in the form of compressed gas are classified as Dangerous Goods (Category 2) and chemical waste, and should be handled, stored and disposed of in accordance with the relevant legal requirements.

(ii) Refrigerators

- Sorting of refrigerators according to types of refrigerants used should be conducted to facilitate subsequent handling.

² LPG means any gas which is a mixture of –

(a) Hydrocarbons primarily consisting of butanes, butylenes, propane or propylene, or
(b) All or any of the hydrocarbons referred to in paragraph (a).

- Refrigerants and compressor oil should be removed without leakage to the environment, and an extraction system should be used for the recovery of refrigerants.
- During the recovery of refrigerants, all hoses should be properly connected and a suitable apparatus with automatic stop function should be used, or a suitable weighing device should be used to monitor the total and increased weights of the container.
- The cabinet should be shredded within an enclosed system under negative pressure. Shredding of hydrocarbon cabinets should only take place under controlled conditions to avoid explosions.
- Insulation foam (such as polyurethane foam) containing blowing agents should be properly removed and handled to avoid emission of ozone depleting substances to the environment.
- Some types of the refrigerants are flammable, such as LPG and ammonia, and corresponding safety precautionary measures should be taken.
- If the refrigerant gas is LPG defined under Gas Safety Ordinance (Cap. 51), the importation, manufacture, storage, transport, supply and use of the gas shall be controlled under Gas Safety Ordinance (Cap. 51).
- Other than LPG, unwanted refrigerants in the form of compressed gas are classified as Dangerous Goods (Category 2) and chemical waste, and should be handled, stored and disposed of in accordance with the relevant legal requirements.
- The concentration of chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) or hydrofluorocarbons (HFCs) should be monitored at appropriate locations of the facility.

(iii) Cathode Ray Tube TVs / Monitors

- Dismantling and shredding of cathode ray tube TVs/monitors will need to meet stringent requirements in respect to pollution prevention, including conducting the process within a designated enclosed room under negative pressure. This should be regarded as treatment of chemical waste. The subsequent recycling or disposal of the leaded glass should be detailed.

- Any residues resulting from broken cathode ray tubes before the processing of the items should be re-contained and segregated properly and be handled as chemical waste.

(iv) Flat panel display (FPD, viz. LCD, LED, plasma) TVs / Monitors

- Dismantling and shredding of FPD TVs/monitors should be detailed and regarded as treatment of chemical waste. The subsequent recycling or disposal of the glass should also be detailed.

(v) Printers

- Components and parts containing toner and/or ink, such as ink/toner cartridges, should be removed from printers. The subsequent recycling or disposal of these components/parts should also be detailed.

(vi) Scanners

- Mercury lamps removed from scanners are classified as chemical waste and should be handled, stored and disposed of as chemical waste.

(e) Contingency measures to tackle emergency incidents

e.1 Provide a full list of alarms and controls for the treatment and recycling processes.

e.2 Identify and state all potentially hazardous situations (in incident types) that may arise at the facility, and evaluate their possible consequences and detail actions to be taken to minimize and mitigate the adverse consequences. Common incident types include power or mechanical failure, adverse weather condition, release of hazardous materials, accidental spillages, fire etc. Include a flowchart to illustrate the procedures in handling emergency situations, and checklists for considering various options to mitigate/avoid serious consequences. Some examples of possible emergency response actions are given below in e.4.

e.3 State the names, post titles and phone numbers (office and home/mobile) of the persons who will be involved in coordinating or implementing the emergency response actions and/or clean-up.

e.4 Examples of Possible Emergency Response Actions

(i) Response to fire

- The emergency coordinator should activate the fire alarm by activating the break glass unit at the nearest manual fire alarm call point.
- Call the Fire Services Department at once by dialing 999.
- If feasible, stop the operation of the facility.
- Evacuate all staff inside the facility to a designated safe assembly place via the nearest available exit/staircase.
- If it is safe to do so, the staff inside the facility may try to put out the fire by using the nearest appropriate firefighting equipment.
- If the fire is out of control, all firefighting activities must be stopped and all personnel must evacuate from the facility immediately.

(ii) Response to major release of hazardous materials

- Call the Fire Services Department at once by dialing 999.
- Personnel discovering the occurrence of any major release of hazardous materials must alert any co-workers nearby and inform the emergency coordinator immediately.
- If feasible, stop the operation of the associated treatment process and evacuate people nearby.
- If it is safe to do so, the emergency coordinator should guide the staff concerned to confine the hazardous materials by using suitable equipment. If more than one type of hazardous materials is released, they should be confined separately and handled one by one to ensure mixing does not happen.
- The hazardous materials should be cleaned-up and contaminated materials should be disposed of. If the hazardous material(s) is classified as chemical waste, it should be handled, stored, collected and disposed of in accordance with the relevant legal requirements.
- If the situation is out of control, all remedial actions must be stopped and all personnel must evacuate from the facility immediately.

Requirements and points to be noted

e.5 An emergency coordinator either stationed at the facility or be able to respond to an emergency by reaching the facility within a short period of time should be appointed, for handling and coordinating emergency response provisions as identified in the contingency and emergency response plan. The emergency coordinator should be conversant with all aspects of the contingency and emergency response plan, all

operations and activities at the facility, the characteristics and location of e-waste handled, the location of all records within the facility, and the facility layout.

e.6 Provide a list of all emergency equipment at the facility.

Emergency equipment	Quantity/No	Location
Fire extinguishers		
Dustpan and brush/broom		
Sand/absorbent		
Mop and bucket		
Towel		
Spare containers for storing waste generated		
Scoop		
Tweezers/forceps		
Hand-operated/electrical pump		
Others (please specify)		

e.7 Detail any mechanism to alert the public in the vicinity. It is necessary to alert the public in the vicinity in the severe cases of fire or release/leakage of hazardous materials or chemical waste. Mechanism may include activation of alarms, calling the police/Fire Services Department etc. Emergency telephone directory of different government departments should be included.

e.8 State the containment, clean-up procedures and disposal of contaminated materials. If the hazardous materials released are classified as chemical wastes, they should be handled, stored and disposed of in accordance with the relevant legal requirements.

e.9 Hazardous materials released should not be flushed down the drain and every effort should be made to contain and recover the materials by various means. Workers responsible for the clean-up operation should be trained for the clean-up work and provided with proper handling and safety equipment.

e.10 State the reporting arrangement of any emergency case to the Authority.

e.11 In the case of fire or other emergency incident occurred, the Authority should be verbally informed of the incident immediately. Details/report of fire and other major incidents, including date/time, nature, scale of incident/extent of impact, emergency response actions taken etc., should be submitted to the Authority within 2 weeks.

e.12 State the frequency of regular emergency drill and post the emergency evacuation plan at prominent locations, e.g. emergency drill should be conducted at a frequency of not less than twice a year.

e.13 State the frequency of regular checking of the emergency equipment, e.g. emergency equipment should be checked at least once per year. For special equipment, the manufacturer's or supplier's recommendation should be followed.

(f) Arrangements for site pollution control and monitoring of possible emissions

f.1 State the location of effluent discharge/air emission points and sampling points, as well as noise measurement points. The points should be marked on a layout plan (can be marked in the plan in (a) above). The sampling points should be the points at which representative samples could be collected.

Requirements and points to be noted

f.2 Discharge standards will be incorporated in the disposal licence terms and conditions.

f.3 Include the frequency of monitoring, parameters to be tested for each sample and the remedial action to be taken in respect of non-compliance with the regulatory standards. The monitoring results, together with findings and remedial actions for non-compliance identified, should be submitted to the Authority on a regular basis. The discharge/emission should be monitored regularly for all the pollutants that may be present. In case of non-compliance with the regulatory standards, the treatment and recycling processes should be examined to check for any malfunctioning, and the facility should suspend operation until the non-compliance has been rectified.

f.4 Detail the submission requirements of annual report on site pollution control. The annual report should at least include (1) description and quantity of each type of e-waste treated, recycled or disposed of at the facility, together with the resulted recycling rates; (2) environmental compliance monitoring data; (3) any non-compliance with the regulatory standards during the year, its cause and the remedial actions taken. An independent professional audit team should be commissioned to carry out the annual environmental audit of the facility

(g) Arrangements for the storage and disposal of treatment residues and byproducts

g.1 Identify all treatment residues/byproducts, including their type, form and quantity. These include materials to be provided to other suitable facilities for further treatment/recycling.

g.2 Give the location and details of storage area for the treatment residues/byproducts. The location of the storage area should best be marked on a layout plan (can be marked in the plan in (c) above). The storage area should comply with relevant legal requirements if the residues/byproducts are classified as chemical wastes.

g.3 Describe the collection and disposal arrangements, as well as the recording arrangements such as registration of vehicles, destinations and weighing of materials, for the treatment residues/byproducts. If the residue is a chemical waste, it should be collected by licensed chemical waste collectors and disposed of at licensed chemical

waste disposal facilities.

(h) Site safety and security arrangements

h.1 Identify the site security provisions. Security measures (i.e. gates, locks, ban on entry for unauthorized persons, proper signages, etc.) should be provided at appropriate areas such as treatment and recycling processes, storage areas.

h.2 State the duties and general requirements for the safety officer with the particulars of safety officers as Annex to the operation plan. The requirements should include the minimum qualification and the years of relevant experience.

h.3 A list of safety equipment provided and its location.

Safety equipment	Quantity/No
Helmet	
Safety goggles	
Gloves	
Safety boots	
Protective clothing or overalls	
Face shield	
Ear plugs	
First aid kit	
Others (please specify)	

(i) Manning levels, and qualifications and experience of staff

i.1 Provide an organization chart showing the names and post titles of key employees responsible for the management of the facility in the plan. Attach their resumes as annex, covering their names, qualifications and relevant experiences. Provide the duty lists of these key staff.

i.2 Indicate the normal manning level to operate and maintain each treatment and recycling process of the facility.

i.3 Detail the relevant training for staff responsible for operating the e-waste treatment and recycling process, implementing environmental control and handling emergency situations.

Requirements and points to be noted

i.4 Those staff who are responsible for operating the e-waste treatment and recycling processes, implementing environmental control and handling emergency situations should receive relevant training, such as those relevant courses organized by the Hong Kong Productivity Council, Labour Department, Occupational Safety & Health Council etc.

(j) Site maintenance and quality assurance plan

j.1 State the details of the quality assurance plan. The assurance plan should include, but not limited to, the following: (1) plant and equipment repair/maintenance arrangements and schedule; (2) quality manual/guidance to be followed by operation personnel.

(k) Arrangements for keeping records

k.1 State the types of relevant record to be kept at the facility.

k.2 State what reports will be submitted to the Authority on a regular basis, and show the standard report format to be used for individual record. Report format should be clear, concise and informative.

Requirements and points to be noted

k.3 Records should include, but not limited to, the following:

- (i) a description and the quantity as well as source of e-waste the facility received, and the corresponding vehicle registration no.;
- (ii) the method and date of its storage or disposal at the facility;
- (iii) the location where the e-waste was stored and disposed of within the facility;
- (iv) a description and the quantity as well as destination of treated e-waste delivered off-site, the corresponding vehicle registration no.;
- (v) liability insurance certificates;
- (vi) maintenance records of plant and equipment;
- (vii) inspection records and reports on mechanical failure or shutdown;
- (viii) reports of any test run and re-test;
- (ix) environmental compliance monitoring report;
- (x) summary reports and details of all incidents submitted under the contingency and emergency response plan;
- (xi) training records (including the qualifications obtained) of all serving and former employees in the past 3 years (except period before the facility was issued with a licence under the WDO).

k.4 Annual reports should be submitted, which should summarise activities of the facility during the previous calendar year and include but not be limited to the following information:

- (i) licence number and detailed particulars of the facility;
- (ii) the calendar year and period covered by the report;
- (iii) a description and the quantity as well as source of e-waste the facility

- received during the year, and the corresponding vehicle registration no.;
- (iv) the method of storage and disposal for the e-waste;
- (v) breakdown of throughput including quantity in-take, treated, recycled, disposed of for each type of e-waste;
- (vi) a description and the quantity as well as destination of treated e-waste delivered off-site, the corresponding vehicle registration no.;
- (vii) environmental control and compliance monitoring data;
- (viii) the details of any contingency and emergency response action taken in the previous calendar year;
- (ix) the details of any change or modification to the facility undertaken in the previous calendar year, and the relevant approval of the Authority; and
- (x) an environmental audit report by an independent environmental consultant, including an audit on recycling rate.

(l) Liability insurance, if any, to cover claims arising out of injuries to persons, properties and the environment which may result from the operations at the facility.

1.1 Provide copies of the certificates of relevant insurance policies, which include:

- (i) Employees' Compensation Insurance;
- (ii) Third Party Liability Insurance for the facility; and
- (iii) All Risk Insurance for the facility.

Indicate the insured amount, validity period and other conditions of insurance policies.

Requirements and points to be noted

1.2 The operator should possess liability insurance to cover claims arising out of injuries to person, property and the environment which may result from the operations at the facility.

1.3 Renew all insurance policies before their expiry. Submit copies of renewed policies to the Environmental Protection Department within 30 days of renewal.

***Environmental Compliance Division
Environmental Protection Department
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