ENVIRONMENTAL GUIDELINES FOR COMPOSTING AND OTHER ORGANIC RECYCLING FACILITIES

“Recycling organic material to benefit the environment...”

Publication 508 **June 1996**

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Environment Protection Authority
State Government of Victoria

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FOREWORD

Organic recycling, such as composting, provides an important way to meet landfill reduction, waste recycling and resource conservation policy targets. Such targets are essential in the pursuit of sustainable development and need to be increasingly adopted to drive changes in the way we manage our municipal, industrial, agricultural and sewage sludge wastes. Through composting, wastes can become resources, and valuable nutrients and organic matter can be recycled back to the land from which they originally were derived.

Through local and overseas experience, we have learned that unless the composting industry is built and operated according to sound principles, significant environmental problems are likely to occur. In view of the potential benefits which can be achieved from composting, it is important that the industry develops to be environmentally sound – so that it continues to attract the support of the community for its activities and products.

I encourage statutory planners to use these Guidelines in evaluating proposals to establish organic recycling facilities. Facility proponents and operators should employ the Guidelines in locating, designing and operating their facilities.

The *Best Practice Environmental Management Series* publications are being issued by the Environment Protection Authority to encourage a pro-active approach to environmental management by industry. The publications promote *best practice environmental management* which will achieve benefits for the community in terms of sustainable improvements in environmental quality and benefits for industry through minimisation of waste and avoidance of environmental problems. Environmentally-aware people seeking a better environment should find merit in this approach.

EPA would be pleased to receive comments on these Guidelines from the composting industry and from other interested parties. Such comments will, where appropriate, be incorporated in future editions.

BRIAN ROBINSON
CHAIRMAN

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CONTENTS (CONT.)

PURPOSE AND APPLICATION

Composting is the controlled biological decomposition or treatment of an organic part of a material to a condition sufficiently stable for nuisance-free storage, and for safe and beneficial use in land applications.

These Guidelines provide existing and potential operators of commercial composting facilities and regulating bodies with:

- a clear statement of environmental performance objectives for each segment of the environment affected
- a statement of the actual or likely impacts of composting operations on the environment and how these are to be assessed and minimised and
- suggested best practice environmental measures or ways to meet the performance objectives or goals, based on available experience.

Each facility operator should ensure the environmental objectives are met by providing the best environmental safeguard measures appropriate to the specific site. These may be selected from the suggested best practice environmental measures, or better alternatives for the site may be developed or provided.

The Guidelines permit and encourage innovative, effective and better solutions for environmental management of composting.

The Guidelines are organised in three sections – processing, product application and management.

A check list is provided in Appendix 2 to enable a compost facility operator to check that all relevant environmental issues have been addressed in accordance with the Guidelines.

The Guidelines apply to all organic recycling facilities using biological processes applied to predominantly solid substrates including:

- composting
- vermiculture (which uses worms to breakdown waste)
- other similar processes.

For the purposes of these Guidelines all such facilities are regarded as composting facilities, and references to compost(ing) apply to the biological processes mentioned above and to their end products – except where a clear differentiation is made in the text.

Where the solid substrate contains sewage sludge these Guidelines continue to apply, together with any other guidelines for sewage sludge which may be adopted in Victoria.

The Guidelines do not apply to the treatment of raw sewage, to septic tanks, or to liquid-phase anaerobic (oxygen deficient) digesters.

2. REGULATORY REQUIREMENTS

All composting facilities must conform with the relevant State environment protection policies and environmental regulations (see Appendix 1). The key objectives of these policies are incorporated in these Guidelines.

Composting or vermiculture facilities with a capacity to produce more than 10 tonnes of compost daily are designated as Scheduled Premises under the *Environment Protection (Scheduled Premises and Exemptions) Regulations 1995* and are subject to the works approval provisions of the *Environment Protection Act 1970*.

A composting facility which treats prescribed waste, regardless of the size of the operation, requires both an EPA Works Approval and licence to operate. A financial assurance is also required. Prescribed wastes are defined in the *Environment Protection (Prescribed Waste) Regulations 1987*. Transport certificates apply to all consignments.

Where it can be clearly demonstrated that the material is a controlled feedstock used for the production of a useful end product and that there are no unacceptable environmental risks, EPA may determine that prescribed waste controls are not appropriate.

Where a composting facility is to be built for the purpose of conducting genuine trials for research, development or demonstration (RD&D) purposes, a simple, specific approval procedure is provided under section 19D of the *Environment Protect Act 1970* to encourage this work. Such approval is only necessary where works approval would otherwise be required (when processing prescribed waste or where the scale of the operation exceeds 10 tonne a day).

3. ENVIRONMENTAL GUIDELINES FOR COMPOST PROCESSING

3.1 TECHNOLOGY SELECTION

The establishment of a successful composting facility hinges on making the right choices to optimise environmental and economic factors – before capital is spent.

Compost production facilities may exist for a variety of purposes, for example:

- the supply of soil amendments or fertilisers
- the production of special growing media, such as mushroom compost or potting mix
- the diversion of waste from landfill, for land regeneration or landfill cover
- the treatment of waste to reduce the cost of disposal or to reduce pathogens.

The selection of the composting technology depends on:

- the purpose of the facility
- market requirements and product quality
- the availability, nature and flexibility desired of the wastes used as feedstock
- how easily particular wastes respond to the biological process
- the siting options available and
- the production capacity of the facility.

These factors must considered by a compost facility operator to select an appropriate combination of siting and technology.

Composting opportunities are too diverse for these Guidelines to detail technology preferences for every case. However the siting guidelines provide the basis for a facility operator to determine the economic trade-off between the higher capital, enclosed processes and the generally lower cost out-door operations, such as windrowing.

Conducting composting process within an enclosed system – such as a vessel or specially designed building – facilitates the control of composting conditions, odour and leachate. Odorous gas is minimised and confined for treatment. Enclosed processes are therefore preferred for offensive wastes or where the operation is close to residential areas.

Outdoor composting is most suited to inoffensive wastes or where the facility can be located well away from odour-sensitive areas. Outdoor composting is generally chosen when the disposal cost of the waste feedstock is low or only a low capital investment is justified. It is often employed for very large scale operations, particularly of a seasonal nature.

All activities associated with the composting operation need careful selection, design and control to avoid environmental impact. Activities to be considered include:

- transport
- raw material or feedstock storage, control
- materials handling
- grinding (comminution, size reduction)
- screening, sorting, blending, mixing
- curing, storage, bagging, loading, dispatch
- disposal of residual waste.

TECHNOLOGY SELECTION

Objective

To select the technology which optimises environmental and economic factors.

Suggested Measures

- Seek expert advice based on waste type and product quality aims.
- Select more highly controlled, enclosed processes for higher strength wastes.
- Observe siting factors (Section 3.2).

3.2 SITING – BUFFER DISTANCES

To provide a basic level of protection from odour, dust and noise, a composting facility should not be located within a minimum buffer distance from designated residential areas or other sensitive land uses.

The buffer protects the amenity of the area from accidental emissions which may occur due to equipment failure, accidents and abnormal weather conditions. The buffer distance is measured from whichever activity capable of emitting odour or other nuisance is nearest a sensitive land use.

Buffer distances are not an alternative to providing appropriate control of the emission source (see Section 3.3).

Determination of minimum buffer distances is outlined on the next page. This provides guidance based on experience gained from existing composting facilities and considers:

- the composting process employed
- the materials to be composted (the feedstock) and
- the scale of the proposed operation.

The buffer distances in these Guidelines supersede those for composting facilities given in *Recommended Buffer Distances for Industrial Residual Air Emissions* – EPA Publication AQ 2/88 (Revision dated July 1990).

Air modelling studies may be necessary at the design stage for large operations when the buffer distances are close to the recommended minima.

Works approvals will consider the buffer distance provided for a proposed operation and approval will be granted on the basis of the intended process, range of intended feedstocks and plant scale.

If a proponent can satisfactorily demonstrate that a facility requires a lesser buffer distance, this may be allowed, provided it meets State environment protection policy requirements. Factors that may be considered include:

- a more advanced process or controlled feedstock source and/or
- a location in a particularly favourable setting, due to its topography, climate or zoning (Planning Scheme).

Siting should also consider the need to protect sensitive water resources. Unless adequate protection of surface and ground waters can be demonstrated, a composting facility should not be sited near surface waters, on a flood plain or in a proclaimed potable water supply catchment.

SITING

Objective

To ensure the facility is sited to minimise environmental impact, consistent with the technology to be used.

Suggested Measures

- Site in accordance with buffer distance recommendations.
- Site at least 100 metres from surface waters.

CALCULATION OF MINIMUM BUFFER DISTANCE

To calculate the recommended minimum buffer distance, determine the process and feedstock ratings from the tables and hence the facility score:

Process Rating + Feedstock Rating = Facility Score.

The minimum buffer distance for 1, 10 and 100 tonne per day plants can then be determined from the *Buffer Distance Chart*. (Interpolate for other plant capacities. Plant capacity is the average output of product at full rates.)

FEEDSTOCK RATINGS

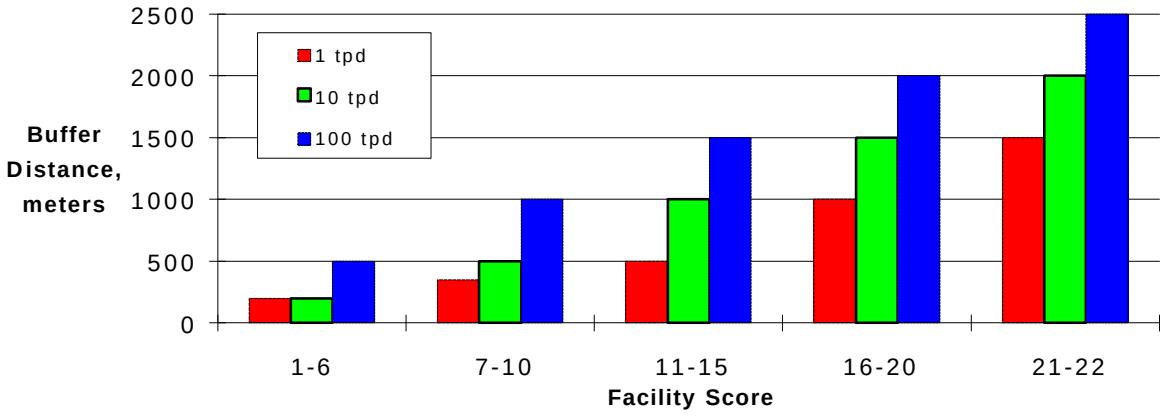
Feedstock composted*	Feedstock Rating
Animal excreta	6
Prescribed waste	5
Food processing waste	4
Municipal solid waste (garbage)	4
Sewage sludge (dewatered)	3
Hard green waste	2
Sewage sludge (> 7 year old)	1

* *Discuss wastes not listed with EPA.*

PROCESS RATINGS

Process type	Process Rating
Static pile /windrow	16
Windrow, turned	12
Vermiculture without pre-composting	9
Windrow, capable of continuous aeration	9
Roofed windrow, turned	9
Vermiculture with pre-composting	6
Roofed windrow, capable of continuous aeration	6
Indoor composting with odour control equipment (o.c.e.)	4
Solid phase anaerobic treatment, in-vessel with o.c.e.	2
In vessel aerobic composting with o.c.e.	1

BUFFER DISTANCES FOR COMPOSTING AT 1, 10, & 100 TONNES PER DAY



3.3 AIR QUALITY

(a) Odour

Composting odours should be minimised by selecting a suitable composting method (see *Technology selection* and *Siting* above).

Site management should have an effective odour control strategy in place to exercise control over, and to minimise odour from, all the odour generating sources on the site – at every stage and activity in the process. This should include the provision of appropriate facilities, operating procedures, training and, where necessary, odour control devices applied to the emissions.

Major potential odour sources and control measures for composting include the following.

(i) Odour from feedstock before it enters the composting process.

- Putrescible or municipal waste should be incorporated into the composting process the day it is delivered, as soon as possible after it is received.
- Other feedstocks should be used as quickly as possible. The amount on site should be limited to less than one week of requirements where possible.
- Water absorption into the feedstock, which restricts access of air and leads to anaerobic conditions, should be prevented. This can be done by providing protection from rain and appropriate stormwater and groundwater controls – see Section 3.4.
- Animal excreta and other potentially odorous wastes should be received and maintained in a dry state to minimise anaerobic decomposition before use.
- Very wet or fluid wastes should be contained in vessels fitted with lids.

(ii) The composting method adopted must be chosen and operated to minimise odour.

- Foul odours usually arise when part of a composting mass decomposes under anaerobic conditions. Without careful design, there is a tendency for anaerobic areas to develop at some stage during the process.

Odour control is generally achieved by providing sufficient fresh air to all parts of the mass to replenish the oxygen used in the process. All outdoor and most enclosed processes should be designed and operated so that aerobic conditions are maintained throughout the mass at all times.

- Some processes are designed to operate under anaerobic conditions. These processes are invariably enclosed and must be fitted with odour control devices.
- The major process parameters need to be optimised for the particular operation and controlled to minimise odour. These include the available carbon-to-nitrogen (C:N) ratio, water content, adequacy of aeration and heap permeability. (See Section 5 for further details.)
- Prevent water logging.

(iii) Odour control equipment may be installed to remove or destroy the odorous components of emissions from the compost process. Such equipment may also be applied to the vents of buildings enclosing operations such as feedstock handling. Suitable control devices include enclosures, bio-filters, wet scrubbers, chemical scrubbers, carbon absorption beds or afterburners.

(iv) Contaminated water may be high in organic material and become anaerobic. It should not be allowed to accumulate on the site except in designated recycle tanks or pits. Aeration may be required to reduce odours from this source (see *Water quality* below).

(b) Other gas emissions

Large volumes of gas are generated during the composting process.

Under aerobic conditions the principal gas generated is carbon dioxide.

Under anaerobic conditions methane is generated. Each is formed naturally from the decomposition of biomass.

While both are greenhouse gases, their contribution from present levels of commercial compost production is not significant in the overall global greenhouse gas equation. Nevertheless, excessive quantities of methane gas release should be avoided.

Significant amounts of hydrogen sulphide, organic sulphides and/or volatile fatty acids are also generally emitted under anaerobic processing conditions. These are highly odorous gases and some are toxic. Odour may therefore indicate anaerobic conditions.

Odour control measures to achieve aerobic conditions will normally minimise the methane, sulphide and volatile fatty acid components of the emission.

Processes designed to operate anaerobically are to be enclosed (see above), the odorous gases scrubbed, and the methane collected and utilised (preferred option) or burnt.

Ammonia and amines are other possible contributors to odour, and may be generated under certain processing conditions. Valuable nutrients may also be lost – particularly with high nitrogen feedstocks such as poultry manure and/or where high processing temperatures occur.

To minimise ammonia loss:

- determine the feedstock C:N ratio and formulate the mix to lie in an appropriate range for the particular application (technical advice or experimentation may be required to determine this ratio)
- avoid overloading the mix with excessive quantities of high quality nitrogen sources
- where the processes are enclosed, consider recovery by scrubbing with recycled water or dilute sulphuric acid.

If the facility incorporates a biological filter, ammonia may have to be removed from the air stream to prevent poisoning of the filter's biota.

(c) Dust and bio-aerosols

The operation must be managed to avoid dust emission beyond the premises.

Dust may be generated by movement of materials by front end loaders and delivery trucks. Such operations may need to be suspended on very windy days.

Dust can occur during storage, grinding, mixing, screening and transport of feedstocks and products. Dust suppression – such as covering dusty materials or applying a light water spray, and enclosing fixed mechanical equipment used to process the raw and finished materials – may be required. Suction sweeping machines may be needed to maintain dust-free sealed surfaces (including roadways).

Dust from the turning of composting materials is less likely due to the normally high moisture content of compost. Dust can be an indication of an insufficient moisture content in the composting mass, which may require adjustment. A light spray with water before or during turning should be considered. Excessive amounts of water for dust suppression should be avoided, to prevent undue run-off or water-logging of the organic material, which can increase the likelihood of anaerobic conditions.

Bio-aerosols are air-borne particulates that may contain bacteria, fungi spores (such as *Aspergillus fumigatus* – the agent causing 'composter's lung'), pathogens or other micro-organisms. Bioaerosols may be generated during the movement or agitation of materials at any stage of the operation. This is most likely to occur when dust is also produced. The generation and dispersion of bio-aerosols should be minimised by appropriate handling and dust control procedures, as outlined above.

Provided good management practices are followed, the concentration of bioaerosols in the neighbourhood and workplace should not increase significantly above background levels.

AIR QUALITY

Objective

To ensure there is no health risk or loss of amenity due to emission of odour, dust, pathogen or toxic compounds.

Suggested Measures

- Have an odour control strategy.
- Minimise storage of unprocessed feedstock.
- Minimise accumulation of contaminated run-off.
- Maintain aerobic conditions for outdoor processes.
- Fit control devices.
- Implement appropriate handling techniques, particularly to control dust.

3.4 WATER QUALITY

Water and land pollution must be avoided by appropriate siting, design, management and control of the facility.

Stormwater and leachate from composting operations may be contaminated by toxic materials, nutrients, micro-organisms, organics, salts and/or metals. These may pose a risk of adverse environmental impact on the receiving surface waters, groundwater or soil.

(a) Stormwater and leachate management

Surface waters must be protected from pollution caused by contaminated stormwater and leachate, preferably by:

(i) keeping contaminated stormwater and leachate separate from clean stormwater

(ii) minimising, containing and re-using contaminated stormwater and leachate so there is no discharge of contaminated wastewater from the premises and

(iii) appropriately monitoring the clean stormwater stream before disposal.

These protective measures are detailed below.

(i) Stormwater separation

All out-door areas involving process materials – pre-storage areas, vehicle loading and unloading areas, processing stacks, maturing and matured product stacks and related activities – should be contained within bunded areas. This is to prevent any contaminated water or solids flowing onto and/or contaminating the clean zones of the site, clean stormwater drains or adjoining properties.

All water that falls within the bunded areas, whether stormwater or leachate, must be regarded as contaminated wastewater and should be captured for re-use.

It is preferable that the above-mentioned outdoor areas are sealed (for example, concreted). Otherwise a base made of low permeability clay, compacted soil or

consolidated and sealed recycled concrete or the like may be used (see *Groundwater* below).

The surface of the bunded areas should be graded so that the water drains to a recycling tank or pit. This pit should be of sufficient capacity to prevent overflow.

Out-door operational activities should be carried out in the smallest possible area, to minimise the size of the bunded areas and the quantity of contaminated stormwater collected.

Indoor operational activities should also have suitably graded and bunded operating surfaces which drain to collection drains to intercept all leachate and run-off for recycling.

Clean stormwater should be segregated from contaminated stormwater – for example by the use of cut-off drains and barriers to direct it away from the main operational areas.

(ii) Contaminated stormwater, wastewater minimisation and re-use

Contaminated stormwater and leachate should be minimised so there is no excess wastewater requiring discharge from the premises. All contaminated stormwater should be totally contained on the site and stored for re-use in the process – with or without treatment. This will decrease the usage of fresh water.

As well as minimising the out-door areas subject to bunding, the facility operator should further restrict the quantity of wastewater generated.

- Avoid run-off from any particularly wet waste feedstock by storing it under cover or in tanks where necessary.
- To avoid significant run-off, control the water added to the materials – during pre-mixing, storage and processing – to the moisture requirements of the process.
- Blend wetter feedstocks with drier ones to provide an appropriate moisture content in the initial heap.

Wastewater storage capacity should be able to cope with heavy rainfall periods without overflowing. Water exceeding process needs should be stored for use in the drier months. The required capacity should be determined by the monthly water balance method (see box on the next page). The collection pit may need to be supplemented by a separate tank or pond.

The wastewater collected may be characterised by a high biochemical oxygen demand which can lead to anaerobic biological action generating odours during storage. It should be used quickly or treated by aeration to reduce the possibility of anaerobic conditions arising in the storage pond or tank.

After maximising its potential for re-use there may still be occasions when leachate or contaminated stormwater exceed process needs. In such cases, it must be discharged to sewer where available, and to land in preference to water:

- If discharged to sewer it must comply with the water authority's trade waste limits.
- Any discharge of wastewater to land should be in accordance with Guidelines For Wastewater Irrigation 1991 (EPA Publication No. 168).
- Wastewater discharged off-site to water must comply with limits in the State environment protection policies (SEPPs) for water.
- Wastewater may require treatment before discharge, to meet the above requirements.

(iii) Stormwater discharge

Provided good planning and housekeeping practices are employed to keep the premises in a relatively 'clean' state, stormwater collected outside the bunded areas or from clean roofs should be acceptable as normal stormwater for off-site discharge without treatment.

The clean stormwater system should be equipped with an interception pit to retain any floating solids or silt that may have by-passed the bunded system. The pit should be regularly inspected after rain to confirm that any discharge is clean.

Consider re-use – see Section 3.6.

If there is an accumulation of waste outside the bunded area, any stormwater collected from this area should be regarded as contaminated and treated as leachate as outlined above, and the waste removed from the area at the earliest opportunity. The facility operator is responsible for ensuring no pollution occurs in the receiving environment of any water discharge.

Determination of wastewater storage capacity required

Storage capacity depends on:

- the composting process employed
- the rainfall pattern of the locality
- the size of the outdoor contaminated areas and
- the treatment provisions and disposal options.

Where the only disposal option for any overflow is to a surface water body without treatment, the storage capacity provided should be designed to avoid off-site discharge in at least nine out of ten years.

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Monthly water balance method

The rainfall collected in a one-in-ten wet year (from meteorological data for the region) and the net water requirements for the process at design rates are computed for each month. The excess is stored and held over to each successive month, using an iterative calculation. This will provide the peak capacity required before the drier periods begin to reduce the volume in storage.

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Lower design capacities may be negotiated with EPA where lower environmental risks are associated with the available disposal options.

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The overall needs of the process will, on average, exceed the rainfall collected. In regions of exceptionally high rainfall, however, an excess of water may occur. In such cases, the method should be used optimise storage capacity and bunded areas, and to control off-site discharge to maximise re-use.

(b) Groundwater protection

Once proclaimed, the objectives of the *State Environment Protection Policy (Groundwaters of Victoria)* must be met.

Applying the policy to composting, a facility operator:

- must not cause any serious or irreversible damage to the groundwater
- must protect the beneficial use of the groundwater of the area and
- must minimise the impact of facility activities on groundwater quality.

Composting activities may pose a risk to groundwater quality if leachate or contaminated stormwater are able to permeate the soil and reach the underlying water table, polluting the ground water.

Contamination, which may affect the beneficial uses of groundwater – such as drinking or stock watering – can occur at a distant location, during its distribution by the underground water system. It is necessary to assess this risk and/or provide measures to reduce or eliminate the risk.

In very wet areas, groundwater can be absorbed into feedstock or compost heaps by a process of 'wicking', which causes water logging and potential odour problems – another reason for operational surfaces to be impermeable.

Unless the bunded areas of the site are fully impermeable (for example totally concreted), a preliminary investigation should be undertaken by the facility operator before site works start, to assess the potential impact on groundwater. This involves:

(i) an elutriability test for hazardous contaminants and nutrients on the feedstocks and on the compost materials at various stages of processing

(ii) determination of the soil type and permeability of the underlying site

(iii) measuring or estimating the depth of the water table at the site and its potential to
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interact with surface water (the likelihood of a temporary perched water table causing problems in peak rainfall periods should also be considered).

(iv) characterisation of the current groundwater quality and the contamination status of underlying soil and

(v) identification of the beneficial uses of the groundwater to be protected.

In the case of small operations, sufficient regional information may be available for items (ii) to (v).

If the risk of impact is high – for example if the composting materials have high levels of elutriable contaminants or nutrients and the permeability of the soil is high – an impermeable surface with bunds must be provided for all areas on which processing and pre-storage is to be conducted.

Where there is a low risk of impact on the groundwater the following minimum protective measures should be implemented:

(i) provide a low permeable surface with bunds on which all processing and pre-storage is to be conducted and

(ii) minimise the quantity of contaminated run-off that could potentially permeate the soil by using best management practices, as listed above for contaminated stormwater.

(c) Soil protection

The underlying soil may also become polluted by components of leachate percolating through the ground, resulting in a contaminated site. This should be avoided by using the same design considerations outlined for groundwater protection. In addition, good housekeeping and machinery practice should be observed to further protect the soil and sub-soil of the land at the operating site.

WATER QUALITY

Objective

To ensure that no contaminated water from the compost premises discharges to surface waters, or pollutes groundwater or the land.

Suggested Measures

- Provide cut-off drains, bunding and hard standing to keep contaminated stormwater and leachate separate from clean stormwater, and to minimise groundwater intrusion.
- Bund and roof the pre-storage and processing areas to prevent contamination and reduce the volume of stormwater.
- Grade and drain the pre-storage and processing areas to a collection pit.
- Place vegetative filter strips of fully composted material around compost heaps to absorb leachate run-off and to divert stormwater run-on.
- Set-up fresh compost heaps on an organic base, such as dry wood chips, or straw, with a high water absorbency.
- Incorporate materials in the feedstock pre-mix which have a high water demand.
- Add only the minimum amount of water needed by the compost process at any time.
- Provide adequate storage of contaminated leachate and stormwater.
- Minimise and re-use contaminated stormwater and leachate to prevent any wastewater discharging from the premises.
- Avoid anaerobic conditions developing in collected water – aerate if necessary.
- Monitor the disposal of clean stormwater.
- Observe good housekeeping.

3.5 NOISE

The *State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade, No. N-1)* requires that all noise from activities on the premises which are received at a noise-sensitive area must not exceed the noise limits for the area, as determined by the methods set out in the policy. The limits are tighter outside the normal working day, such as in the evening and especially at night.

Noise nuisance from compost operations may arise from the use of both mobile and fixed machinery within the plant and from movements of transport servicing the site.

Depending on the location of the facility, suitable noise suppression or abatement measures – such as improved mufflers, attention to muffler maintenance, enclosure of noisy equipment and provision of earthen embankments or other noise screens – may be required.

It may also be necessary to avoid certain operations before 7 am and after 6 pm on weekdays, before 7 am and after 1 pm on Saturdays and throughout Sundays and public holidays.

NOISE

Objective

To ensure no noise nuisance results from the facility.

Suggested Measures

- Fit and maintain appropriate mufflers on mobile equipment.
- Enclose noisy equipment.
- Provide noise attenuation screens.
- Restrict operating hours.
- Maintain designated buffer distances.

3.6 WASTE MINIMISATION

Under the *Industrial Waste Management Policy (Waste Minimisation)* of 1990, all premises subject to works approval must have waste management plans incorporating waste minimisation. Each composting facility should assess opportunities for reducing waste from its operations.

Priority should be given to eliminating the discharge of contaminated water from the site, as described under *Water* above.

Other waste reduction options should also be identified and considered. Some possibilities are listed under *Suggested Measures* and depend on the technology chosen.

WASTE MINIMISATION

Objective

To minimise wastes and emissions.

Suggested Measures

- Recycle all wastewater including contaminated stormwater.
- Where there is a regular process water deficit, consider using uncontaminated stormwater after using all the contaminated stormwater.
- Reprocess off-specification material.
- Control air rates to match the aerobic requirements of the process.
- Recirculate aeration air to conserve heat and reduce emissions.
- Conserve moisture, if appropriate.
- Segregate odour sources for separate elimination or treatment measures.
- Conserve, recover and utilise heat.
- Recover methane for use (anaerobic processes only).
- Consider uses for the carbon dioxide produced (enclosed aerobic processes only).

3.7 OTHER ENVIRONMENTAL ISSUES AT THE COMPOSTING SITE

(a) Litter

The generation of litter should be avoided as much as possible from every stage of the operations – especially where outdoor composting is employed. Measures should be taken to prevent the recurrence of litter episodes.

Windblown litter must be prevented from leaving the premises – for example, by suitably designed site fences and moveable litter screens combined with regular clean-up. Any litter inadvertently conveyed off-site should be cleaned up immediately.

(b) Rodents, flies and birds

Operations at the composting site must be controlled to avoid transmittal of disease, by minimising vectors (such as rodents and flies) and the attraction of birds. This requires close attention to housekeeping and observance of rules for particular feedstocks (see Section 3.3, *Odours* above).

Depending on the feedstock, it may be desirable to apply a covering layer of final product when constructing an outdoor composting heap – which will reduce flies and birds.

(c) Disposal of residual waste

Provision should be made for storage and the timely removal and disposal of any rejected material or residual waste.

Disposal should be in accordance with requirements for the most obnoxious waste in the feedstock, or otherwise agreed with EPA.

(d) Fire contingency

Provide fire water systems and adequate vehicular access to prevent inadvertent emission of smoke. Consult with the appropriate fire authority on facility layout and services.

(e) Restoration on vacating site

In managing the operation, the facility operator should be mindful that on vacating the site, the operator will be responsible for the removal of any contamination or waste, and for the restoration and revegetation of the site.

An environmental evaluation of the site should be conducted before construction of the facility.

OTHER ENVIRONMENTAL ISSUES

Objective

To protect the local environment from other environmental nuisances.

Suggested Measures

- Prevent litter.
- Avoid rodent and fly infestations; minimise the attraction of bird.
- Remove residual waste quickly and appropriately.
- Provide a firefighting system.
- Avoid future problems in site restoration.

4. THE COMPOST PRODUCT – ENVIRONMENTAL GUIDELINES FOR THE COMPOST FACILITY OPERATOR

4.1 GENERAL PRODUCT REQUIREMENTS

(a) Protecting the application site

A compost product must not be applied (or sold or supplied) if it contains contaminants or pathogens at a level likely to contaminate the land or pollute surface waters or groundwater by leachate or run-off from the land. The product must not pose a health risk – for example, by causing contamination of foods derived from the land.

A facility operator whose product causes pollution not only risks fines but also endangers the viability of the business with potential liability for damages and clean-up costs.

(b) A product – not a waste

A number of regulations prohibit or control the disposal to land of various wastes – such as municipal waste, prescribed waste, sewage sludge, litter. EPA may grant approval for land application of a particular waste product after suitable processing where:

- it does not constitute an environmental hazard in the proposed application
- a particular need is satisfied in its use and
- appropriate controls are in place to ensure these criteria are always met.

Organic waste properly composted will generally be regarded as a genuine product – that is, 'compost' – and not as a waste if it satisfies these criteria.

The primary responsibility for satisfying these criteria lies with the compost facility operator.

(c) Facility operator's responsibilities

To satisfy the first criterion above – no environmental hazard in the use of compost – the following potential issues must be addressed:

- heavy metals, pesticides and other organic toxic contaminants
- health effects from human and animal pathogens
- land effects – plant pathogens, weeds
- unpleasant odour generation in its use.

The second criterion requires the material to meet a genuine need. This criterion may not be satisfied if, for example, the compost was applied to land in excess of nutrient requirements. This would be regarded as an inappropriate means of disposal.

(d) Product specification

The facility operator should manufacture each product to a specification that conforms to maximum acceptable limits of environmental parameters appropriate for the product's intended use. The specification should be based on:

- a product standard recognised in Victoria, such as an appropriate Australian Standard
- criteria developed from an industry best practice guideline and/or
- quality criteria agreed with an appropriate authority.

The focus should be on the contaminants posing the greater risks. Environmental contaminants which are unlikely to be present in the feedstock or product may be excluded from the specification.

Products may be graded for unrestricted use or for specific, restricted uses and/or application rates.

(e) Quality assurance

Successful quality control starts with a policy of 'getting it right first time' for each batch of compost. This approach will save money by avoiding extra processing and testing.

To ensure each batch meets specification, the facility operator should have quality assurance procedures and workplace practices suited to the local situation. Such procedures include control and monitoring of feedstock and process operating conditions, and recording and testing of the product.

The proposed Australian Standard for compost is likely to provide approved procedures to assure a quality product.

The extent of sampling and testing will depend on the expected contaminants or pathogens in the feedstocks and the end uses of the product. Compost operations with little risk of contamination – such as those using only hard green waste – may adopt a minimum testing frequency.

Products not conforming to the quality site's protocol should be down-graded or re-processed.

(f) Product information and labelling

To enable the compost user to select a product environmentally suited to its application, the facility operator should provide information, including any warnings, for all products on:

- acceptable uses for the product
- maximum limits of contaminants likely to be present
- human and animal pathogen content
- viable weed seeds and plant pathogens
- any application or quantity restrictions
- the responsibilities of downstream formulators and on-sellers to observe any use restrictions and
- user requirements of any sewage sludge guidelines which may apply.

These Guidelines relate to the protection of the environment. Other regulations may also apply to protect other matters – such as agriculture or the health of the compost user. In particular, compost sold for domestic use should be labelled in accordance with any Australian Standard or Department of Human Services (DHS) requirement.

(g) Sewage sludge guidelines, approvals

Compost derived from sewage sludge shall conform to any guidelines for sewage sludge which may be adopted nationally or in Victoria.

Until such guidelines are adopted, it is recommended that the facility operator use the draft *Guidelines for Sewerage Systems – Biosolids Management* (Agricultural and Resource Management Council of Australia and New Zealand (ARMCANZ), Occasional Paper WTC No.1/95, October 1995). Note that the guidelines include procedures for quality assurance, recording and notification of site application.

COMPOST PRODUCT

Objective

To ensure the application of compost avoids pollution of land, contamination of water or food, or the generation of odour.

Suggested Measures

- Have a specification for each product which limits environmental parameters according to the product's intended use.
- Control the feedstock and the process to limit contaminants and pathogens.
- Apply quality assurances procedures – to control, monitor, test, record.
- Grade and label products according to appropriate use.
- Provide appropriate product information to the user.
- Consider using an Australian Standard for the products and becoming an accredited producer.
- Comply with any guidelines for sewage sludge.

4.2 CONTAMINANT LEVELS

Product contamination occurs when unacceptable components in a feedstock are not removed or destroyed in the operation.

Wastes such as sewage sludge, municipal solid waste and some industrial wastes often contain heavy metals, pesticides or other toxicants. Heavy metals will generally pass through a composting operation into the product, although their chemical form may be altered.

Pesticides and other toxic organics may be degraded by the process into non-toxic organic matter. Unless the process is designed to degrade these contaminants, however, some of these contaminants may remain unchanged or convert to a toxic by-product in the product.

Compost or compost blends intended for unrestricted use must meet a specification which applies stringent limits to environmental contaminants (see Table below).

Where heavy metal or other contaminant levels exceed the unrestricted use levels, the facility operator should identify acceptable uses of the product and produce it to an appropriate specification. Restrictions on the use of such products should be identified, agreed with EPA and conveyed to the user.

Special formulations may also be made to a specification (for example, for copper, selenium or zinc deficient soils).

When any contaminant level exceeds the limit for all available uses, the product should be downgraded, reprocessed or disposed of appropriately as a waste.

Operational controls should be applied to ensure the product meets specification. These may include:

- excluding or limiting the proportion of particular wastes in composting
- specifying limits and monitoring heavy metals or other contaminants in the wastes accepted for composting
- focusing on those contaminants likely to be present at significant levels
- for municipal waste, segregating and sorting the waste or the product
- protecting against undetected contaminants in the feedstock (for example, batteries).

Limits for contaminants in compost for unrestricted use*

Contaminant	Dry solids (mg/kg)
Arsenic	20
Cadmium	3
Chromium	50**
Copper	60**
Lead	150
Mercury	1
Nickel	60
Selenium	5
Zinc	200
DDT/DDD/DDE	1.0
Aldrin	0.2
Dieldrin	0.2
Chlordane	0.2
Heptachlor	0.2
HCB	0.2
Lindane	0.2
PCBs	1.0

** Heavy metals – generally from the draft Australian Standard for comment* Composts, Other Soil Conditioners and Mulches

*** from ANZECC* Guidelines for the Assessment and Management of Contaminated Sites, *Jan 1992*

Pesticides and PCB – from the draft Guidelines for Sewerage Systems – Biosolids

Management *ARMCANZ Occasional Paper WTC No 1/95, October 1995.*

CONTAMINANTS

Objective

To avoid pollution from heavy metals, pesticides and other toxicants in the product.

Suggested Measures

- Avoid unsuitable wastes.
- Control contaminants in feedstock.
- Sort the waste before composting.
- Monitor expected contaminants in feedstock and/or product.
- Separate products of differing quality.
- Recycle or dispose of as a waste any unduly contaminated product.

4.3 HEALTH – HUMAN PATHOGENS

Compost – especially if derived from sewage sludge, animal excreta, offal, grease trap sludge, food residues, or unsegregated municipal solid waste – needs effective treatment to reduce the risk of pathogen transmission. Typical pathogens of concern are:

- viruses (enteric viruses)
- bacteria (for example, faecal coliform, *Salmonella sp*., *Legionella*, epidermal and respiratory pathogens)
- protozoans (*cryptosporidium*, *giardia*)
- helminth (*taenia*, *ascaris*)
- roundworms, tapeworms and liver fluke.

To reduce the risk of pathogen transmission the compost facility operator must ensure that:

a) an appropriate specification is set for each product

b) every part of the material is effectively treated and/or pasteurised

c) the pathogen reduction procedures are validated for each product type

d) the product does not become re-contaminated and

e) appropriate quality assurance is conducted (refer Section 4.1).

Pathogen reduction may be achieved during composting and/or a subsequent treatment.

(a) Pathogen limits

Pathogen limits for products derived from feedstock free of sewage sludge have not yet been addressed by Australian standards or regulation. The facility operator should seek expert advice when producing compost from wastes potentially contaminated with pathogens harmful to humans. This is of particular importance for products supplied for unrestricted (including domestic) use, or for particular agricultural uses.

For compost derived at least in part from sewage sludge, the minimum pathogen requirements for

products specified for unrestricted use are shown in the following table.

Note that any adopted guidelines for sewage sludge products shall take precedence over the pathogen content and temperatures in these Guidelines, which are reproduced here to assist and inform facility operators.

Pathogen or indicator limits in compost derived from sewage sludge*

Parameter	Maximum Levels (dry weight basis)
*E. coli***	< 100 MPN per gram of solids
Salmonella sp. bacteria	< 1 MPN in 50 grams
Sampling and analysis	In accordance with Australian Standard AS 1766 in a 50 g sample
Composting processes other than those in the Table below	Demonstrate 100% inactivation of Taenia or Ascarid Parasite eggs and < 1 enteric virus in 100 g sample.

Note: MPN = Most Probable Number.

** generally from draft* Guidelines for Sewerage Systems – Biosolids Management *ARMCANZ Occasional Paper WTC No 1/95, October 1995.*

*** this is an indicator of faecal matter. Some biosolids guidelines use faecat coliforms, as the indicator.*

(b) Pathogen reduction procedures: operating temperatures

The risk of pathogen transmission is minimised by ensuring every part of the material is maintained at a sufficiently high temperature for an appropriate length of time. Generally, the higher the temperature, the less the period of exposure required. The particular conditions selected will depend on the process, the materials used and the product use.

The facility operator should determine the minimum operating conditions and quality assurance requirements for each product type, based on experimentation and experience.

Typical minimum processing temperatures to achieve pathogen requirements for products specified for unrestricted use, are shown in the following Table. The Table provides *an indication only* of minimum conditions for non-sewage sludge-based products, in the absence of other recognised criteria presently available and also shows the usual minimum processing requirements for sewage sludge-based products.

Non-thermal methods of pathogen reduction may also be used. For vermiculture and other specialised forms of organic recycling, the onus is on the facility operator to demonstrate that pathogen reduction is achieved and to provide appropriate monitoring and process control.

Typical Minimum Temperature Conditions in Composting to Meet Pathogen Requirements

Feedstock contains	Process type	Minimum temperature/time requirements	Based on
No sewage sludge	In-vessel (aerated) ∅	For example, 58-60^{O}C for eight hours throughout the mass (other equivalent temperature/time regimes are possible)	Draft Aust Standard(1)
	Static aerated pile Turned windrow, with or without forced aeration Turned pile	55^{O}C for three days or equivalent should be achieved for the whole mass and: • Monitor temperature profiles • For static pile, insulation may be required • For other processes, efficient turning is necessary	Draft Aust Standard(1)
Sewage sludge	Within-vessel (aerated) ∅	55^{O}C or higher for at least three days or 60^{O}C for 24 hours **, and for each case: • biosolids to be digested prior to composting • provide 30 days maturation before product use	ARMCANZ (2) US P 503(3)
	Windrow, turned	53^{O}C or higher for 15 days, with at least five turnings over this period plus: • provide 30 days maturation before product use	ARMCANZ(2)
	Static aerated pile	55^{O}C or higher for at least three days	US P 503 (3)

Æ that is, homogeneous temperature conditions throughout.

** *based on a temperature-time formula*, Time in Days = 131,700,000 x $10^{-0.14\,t}$, t in ^{O}C.

(1) Adapted from Draft Australian Standard for Comment, Composts, Other Soil Conditioners and Mulches, *Appendix L.*

(2) draft Guidelines for Sewerage Systems – Biosolids Management *ARMCANZ, Occasional Paper WTC No. 1/95, October 1995*

(3) From USA's Part 503 Rule *for Class A pathogen requirements*

(c) Validating procedures for pathogens

A compost facility operator should confirm pathogen reduction procedures by testing the compost for pathogens:

- at the start of production of each new product type and
- every time there is a significant change in feedstock or processing procedures.

Compost derived from animal excreta or offal, unsegregated municipal solid waste, sewage sludge or other wastes with a high pathogen risk will generally need regular microbiological testing.

(d) Preventing re-contamination of product

Best practices to avoid re-infection of the product include:

- separation of the feedstock and product handling equipment, vehicles and areas
- thorough washing between use of machinery, wheels and so on
- maintaining a high standard of housekeeping and
- separation of potentially pathogen-contaminated feedstock from relative clean feedstock.

HUMAN PATHOGENS

Objective

To ensure the product meets specification for human pathogens.

Suggested Measures

- Ensure all material is exposed to high temperatures for an appropriate length of time.
- Monitor temperature profiles.
- Determine operating conditions and practices needed for each product.
- Reprocess products not complying with the quality assurance protocol.
- Regularly test for pathogens.
- Prevent product re-contamination.
- Reassess procedures for pathogen control on change of feedstock or process.

4.4 LAND USE EFFECTS – PLANT PATHOGENS, WEEDS, ODOUR

The wide distribution of compost products is a potential avenue for the spread of plant diseases and noxious weeds. This is of concern to agriculture, horticulture and the environment.

The compost facility operator has a major responsibility to minimise such risks.

The extent to which the final product is free from plant pathogens and weeds depends upon its intended use and should be reflected in the product specification (see Section 4.1).

Thermal treatment and/or pasteurisation of the compost material (as described in Section 4.3), has the potential to eliminate most of the plant pathogens and weed seeds, depending on the composting temperature/time relationship.

Plant pathogens can form spores which may survive the compost process if the temperature/ time relationship is not suitable. Likewise, some weed seeds can survive the composting process.

The facility operator should determine the minimum operating conditions and quality assurance requirements for each product, based on experimentation and experience, and reconfirm each time there is a significant change in feedstock or processing procedure.

It is the facility operator's responsibility to determine which plant pathogens and weed seeds the process inadequately handles, and to exclude these from the product through appropriate selection of the source, control and monitoring of the incoming feedstock.

These requirements and responsibilities apply equally to facility operators of specialised organic recycling processes which do not involve a thermal treatment step, such as vermiculture.

Poor quality compost can cause odour complaints from neighbours or the user when applied to the land. To avoid this, any offensive waste in the feed should be well degraded or matured before product dispatch.

PLANT PATHOGENS, NOXIOUS WEEDS, PRODUCT ODOUR

Objective

To protect the beneficial uses of the land from plant pathogens, noxious weeds and odour arising from the use of the product.

Suggested Measures

- Ensure appropriate treatment to eliminate weed seeds and plant pathogens to a level suitable for the product's use.
- Validate process effectiveness against plant pathogens and weed seeds.
- Control feedstocks at source.
- Monitor, intercept and avoid feedstocks diseased or containing noxious weeds – unless the process is specifically designed for them.
- Provide product information on potential viable weed seeds and plant pathogens, and acceptable uses.
- Restrict the use and movement of products with a risk of contamination, to acceptable end-uses.
- Avoid product odours by sufficient maturing.

5. COMPOST FACILITY MANAGEMENT

Good management by the facility operator is essential for achieving a consistently high level of environmental performance. This involves the following.

1 Management commitment

Demonstrate management commitment to an environmental policy and communicate this to all employees.

2 Process choice

Use a composting process appropriate to the wastes being recycled and the site location (Sections 3.1, 3.2).

3 Facility design

Design and operate the facility to meet the environmental requirements of these guidelines and any conditions in the works approval or other agreements.

4 An environmental management system

Provide an environment management system which embraces all aspects of the environmental performance of the composting facility.

5 Control of the process and operations

Control all aspects of the operation, including:

- detailed written procedures for each activity which are used by operational staff
- optimise and control the composting conditions to minimise environmental risk and to produce a consistent product (see Table below)
- a high level of housekeeping on the site
- regular training of personnel
- keeping records of feedstocks processed and recipes used
- alert and informed supervision.

6 Control of waste feedstocks

Control the feedstocks accepted into the site to ensure the feedstocks used are always consistent with siting, process capability and product quality.

7 Control of the product

Implement best practice management guidelines of Section 4.

8 Control of emissions and wastes

Understand and control all process wastes and emissions.

Have contingency plans (including plans to deal with any excess water and any odour excursions).

9 Community relations

A well managed facility is expected to have an open attitude to the community when responding to community complaints. Such attitudes earn the respect of the community as a provider of a positive environmental service. EPA can help operators develop a community relations strategy.

10 Occupational health and safety

The facility should be operated in a way which ensures occupational health and safety. (Occupational health and safety requirements are outside the scope of these guidelines.)

ENVIRONMENTAL MANAGEMENT

Objective

To achieve a consistently high level of environmental performance by good management of the operation.

Suggested Measures

- Have an environmental management system.
- Control the waste.
- Write down the procedures.
- Optimise composting conditions.
- Insist on good housekeeping.
- Train site personnel.
- Keep records.
- Have contingency plans.
- Develop good community relations.

Some processing variables important in composting

Process control variable	Important for
Recipe and wastes used	Achieving correct biological/ microbial activity
Permeability of the materials	Aeration, water holding capacity; heap structure; end-product control
Mixing	Uniform distribution of ingredients; temperature; aeration; moisture
Stack dimensions*	Affects turning efficiency of machines; temperature; aeration; moisture
Ingredients – available C:N ratio	Microbial activity; final product value
Moisture content	Microbial activity; aeration; temperature
Temperature	Product uniformity; effective pathogen reduction; microbial activity
Aeration	Temperature; microbial activity
Turning frequency*	Temperature control; aeration; product uniformity
pH	Microbial activity
Duration	Effective pathogen reduction; product maturity
Microbial populations	Product quality; effective processing and chemical conversions.

** depending on technology involved*

APPENDIX 1 ENVIRONMENTAL LEGISLATION RELEVANT TO COMPOSTING AND OTHER ORGANIC RECYCLING

Legislation

Environment Protection Act 1970

Establishes the jurisdiction and powers of the Environment Protection Authority and the segments of the environment to be protected.

State environment protection policies

The Air Environment

Determines beneficial uses of the air environment to be protected, air quality indicators and objectives for specific gaseous components, and attainment programs to achieve these objectives for air.

Its scope includes emission controls, the control of odour and the provision of buffer zones.

Waters of Victoria

Determines beneficial uses of the water environment to be protected, water quality indicators and objectives for specific segments of the water environment, sets emission limits for components in any discharges, variations with locality, and attainment programs to achieve these objectives. Promotes waste minimisation.

Control of Noise from Commerce, Industry and Trade

Protects people from noise, generated by commerce, industry and trade in the Melbourne metropolitan region, that may affect the beneficial use of noise sensitive areas. Provides an attainment program to meet specified objectives.

(The policy is also used as a guideline in other regions. Noise sensitive areas include domestic, recreational and hospital activities, particularly related to sleep at night.)

Groundwaters of Victoria, Draft 1994

Protects groundwater from activities potentially detrimental to groundwater quality.

Siting and Management of Landfills Receiving Municipal Wastes

Protects existing and future beneficial uses of the air environment, surface waters and groundwaters, and protects residents from the effects of landfills receiving municipal wastes. Promotes waste minimisation and resource recovery.

Industrial Waste Management Policy (Waste Minimisation)

This Policy aims to protect human health and the environment by minimising industrial waste – to conserve resources, reduce costs associated with disposal and improve cost efficiency of industry.

The Policy's attainment program requires all premises subject to works approval to have waste management plans identifying waste minimisation options, with a focus on waste avoidance, reduction and re-use. Premises issued with Pollution Abatement Notices may also be required to develop and submit waste management plans.

Regulations

Environment Protection (Prescribed Waste) Regulations 1987

Defines and lists prescribed waste for the purposes of the Act.

Environment Protection (Transport) Regulations 1987

The transport regulations, including transport certificates and permitted vehicle systems, apply generally to all off-site movements of prescribed wastes.

Environment Protection (Scheduled Premises and Exemptions) Regulations 1995

Composting and vermiculture premises are scheduled premises where the amount of finished product exceeds ten tonnes a day. These premises are required to seek works approval but do not require a licence.

Storage, treatment, reprocessing or disposal facilities which handle any prescribed waste not generated at the premises require works approval and licensing.

APPENDIX 2 QUICK REFERENCE AND CHECK-LIST FOR COMPOST FACILITY OPERATORS

This check-list summarises the specific environmental issues which need to be addressed in a composting facility. Provision is made for the compost facility operator to check off each issue as it relates to a facility. The issues are listed in the same order as they appear in the guidelines.

CHECK LIST

Issue	Objectives are achieved by... (1)	Guideline Reference
Works Approval requirement: – more than 10 tonnes per day?		2
– treats Prescribed Wastes?		
Technology selection: – appropriate selection		3.1
Siting: – siting near natural water sources		3.2
– process chosen and rating		
– feedstocks used and rating		
– plant size (tpd), and facility score		
– minimum required buffer distance		
– actual buffer distance provided		
– works approval restrictions		
Air quality: – odour control: – feedstock management		3.3a
– conditions optimised		
– odour control devices		
– wastewater		
– other air emissions		3.3b
– dust and bio-aerosols suppression		3.3c
Water quality: – contaminated storm-water: – segregation		3.4b i
– cut-off drains and bunding		
– hard standing		
– management of contaminated waters: – minimising its generation		3.4b ii
– collection and containment		
– storage capacity provided		
– re-use – total, or partial?		
– treatment and any discharge		
– clean stormwater: – monitoring		3.4b iii
– suitability for discharge		
– discharged to		

1. Facility operator to summarise method in one to five words. Add reference to relevant part of accompanying text.

CHECK LIST (CONT.)

Issue	Objectives are achieved by... (1)	Guideline Reference
– re-use		
– groundwater protection: – initial assessment of risk		3.4c
– beneficial use of groundwater – depth of water table		
– soil type, permeability		
– impervious surface, bunding		
– minimisation methods		
– soil protection		3.4d
Noise: – is area sensitive to noise?		3.5
– suppression/ abatement/ controls		
Waste minimisation: – has waste management plans?		3.6
– specific waste minimisation measures		
Other site environmental issues: – litter control		3.7a
– rodents, flies and birds		3.7b
– disposal of residual wastes		3.7c
– fire contingency		3.7d
– restoration of site on vacating		3.7e
Compost product controls: – specific risks to application site		4.1a
– a genuine use of the product		4.1b
– facility operator's responsibilities met		4.1c
– specifications for each product? – intended uses of products		4.1d 4.1d
– quality assurance protocol		4.1e
– any standards adopted		
– product information and labelling		4.1f
– do sewage sludge guideline apply? – any approvals required?		4.1g
– contaminant levels: – likely contaminants in wastes		4.2
– methods of control		
– health – human pathogens: – likely pathogens in wastes		4.3
– pathogen reduction method(s)		
– pathogen limits set		4.3a
– temperature regimes proposed		4.3b

1. Facility operator to summarise method in one to five words. Add reference to relevant part of accompanying text.

CHECK LIST (CONT.)

Issue	Objectives are achieved by... (1)	Guideline Reference
– vermiculture -pathogen control		
– validation of pathogen reduction procedures		4.3b
– prevention of re-infection		4.3c
– quality assurance procedure includes pathogens?		4.1e
– plant pathogens and weeds: – procedures for minimising risk		4.4
Environmental management		5
– environmental management system		
– written procedures		
– composting variables optimised		
– contingency plans		
– community relations program		
Best practice environmental guidelines: – operation conforms to these guidelines?		

1. Facility operator to summarise method in one to five words. Add reference to relevant part of accompanying text.

EPA Publication 508