



BEST PRACTICE GUIDELINES FOR LANDFILLS ACCEPTING CATEGORY C PRESCRIBED INDUSTRIAL WASTE

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1. OVERVIEW

The *Environment Protection Act 1970* ('the Act') sets out the broad legal rules needed to protect Victoria's environment. It also provides for the making of state environment protection policies and waste management policies to set more detailed rules in particular areas.

One such waste management policy is the *Industrial Waste Management Policy (Prescribed industrial waste)* ('IWMP (PIW)'), which provides a framework for classifying prescribed industrial wastes¹ ('PIWs') as Category A, B or C, based on their hazard characteristics. Category C PIWs are those which pose a low hazard or only exhibit offensive aesthetic properties.

The IWMP (PIW) allows municipal landfills to accept Category C PIWs, but only if they are 'best practice' landfills.

Clause 14(1) of the IWMP (PIW) requires landfills to be designed, operated and maintained in accordance with any relevant environment protection guidelines approved by EPA. This publication, *Best practice guidelines for landfills accepting Category C prescribed industrial waste* ('the 2008 guidelines' or 'these guidelines'), is one such guideline and, as the title suggests, the 2008 guidelines apply only to landfills accepting Category C PIWs.

The rules and benchmarks applying to landfills generally (including Category C-accepting landfills) are set out in the *Waste Management Policy (Siting, design and management of landfills)* and in EPA publication 788, *Best practice environment management: Siting, design, operation and rehabilitation of landfills*.

Operators of landfills not previously licensed to accept Category C PIWs need to apply to EPA for a works approval and licence if they intend to accept these wastes. Their applications must demonstrate how best practice requirements would be met. Landfill operators already licensed to accept Category C PIWs need to upgrade, by implementing best practice requirements for any new cell and cap they construct, and by improving their landfill management systems in accordance with these guidelines.

1 Prescribed industrial wastes are listed in the *Environment Protection (Prescribed Waste) Regulations 1998*, as amended from time to time.

2. BACKGROUND

In May 2006, EPA released the *Draft best practice requirements for landfills accepting Category C prescribed industrial wastes* for public comment. EPA received 10 written submissions on the draft, plus feedback through information sessions. Taking the submissions and feedback into account, EPA amended the draft and made the 2008 guidelines.

In section 3 below, these guidelines set out the best practice requirements that only landfills accepting Category C PIWs must comply with. But first, it is important to make clear what wastes are covered by the Category C classification and what are the existing requirements applying to all landfills, including 'best practice' landfills (because Category C-accepting landfills must comply with them as well).

The scope of Category C wastes

According to the IWMP (PIW), Category C PIWs are subdivided into two classes:

- C(1) – waste with potential amenity effects, non-persistent organic wastes
- C(2) – other low environmental risk wastes.

Category C(1) wastes include wastes that are highly odorous and/or dusty. Most C(1) wastes are generated by food processing operations.

Category C(2) wastes include:

- PIWs with low contaminant levels (these wastes will be referred to in these Guidelines as 'low-hazard PIWs' and most of them are generated by industrial or manufacturing activities)
- immobilised PIW² which, prior to treatment, was a Category B waste (these wastes will be referred to as 'Category C immobilised waste')
- Category C contaminated soils³
- waste asbestos that has been managed in accordance with EPA publication 364, *The transport and disposal of waste asbestos*.

EPA has developed *Guidelines for hazard classification of solid prescribed industrial wastes* (EPA publication

2 Any waste generator wanting to dispose of an immobilised waste must first seek approval from EPA for the classification of the waste stream.

3 Since 1 July 2007, as a result of amendments to the *Environment Protection (Prescribed Waste) Regulations 1998*, 'Category C (contaminated soil)' replaced 'Contaminated soil (low-level)'.

996). These guidelines set out the general criteria, including contaminant thresholds for wastes from industrial or manufacturing sources, whereby solid PIWs can be classified as Category A, B or C. Category A waste is the highest category, whereas Category C is the lowest.

There is one C(2) subcategory, contaminated soils, whose classification is not dealt with by publication 996. EPA publication 448, *Classification of wastes*, sets out the criteria for assessing (amongst other things) waste soil, including the criteria that define Category C contaminated soils.

Note: where soils require immobilisation to reduce the hazard category, they are considered an industrial waste and therefore require classification against publication 996.

Existing landfill requirements applying to all landfills (including 'best practice' landfills)

- All landfills must comply with the *Waste Management Policy (Siting, design and management of landfills)*. Specifically, a BPML must meet the objectives and each required outcome of EPA publication 788, *Best practice environment management: siting, design, operation and rehabilitation of landfills* ('the BPEM'), as amended from time to time. To achieve those objectives and outcomes, a landfill operator must either propose and implement the measures suggested in the BPEM or, if proposing to use alternative measures, satisfy EPA, before implementing them, that they will provide at least an equivalent environmental result.
- As already mentioned, the IWMP (PIW) only permits a municipal landfill to accept Category C PIWs if it is a 'best practice' landfill. According to the IWMP (PIW), a 'best practice municipal landfill ('BPML') 'reflects the best available technology for a municipal landfill in siting, design, construction, operation, maintenance and post-care'. Further, a BPML must be 'operated in accordance with an appropriate management system that ensures adequate supervision, control on waste receipt, safe handling, record keeping and placement of prescribed industrial waste in accordance with requirements for that waste'.

In addition to complying with the above existing and best practice requirements, there are some further specific requirements that BPML operators accepting Category C waste must meet, and they are set out in section 3 of these guidelines (below). In particular, it addresses requirements for landfills accepting Category C immobilised waste.

3. BEST PRACTICE MUNICIPAL LANDFILLS

This section sets out the requirements for landfills that accept Category C PIW. Guidance is provided in the following areas: siting, landfill cell design, construction quality assurance plan, waste disposal, waste receipt, monitoring, reporting, community involvement and financial assurance.

3.1 Siting

A landfill operator intending to become licensed to accept Category C PIW must ensure that a sufficient buffer is available for the life of the landfill. The buffer distances recommended in the BPEM should be applied. Where this buffer distance is not available, the operator must significantly improve management practices to provide at least the same level of protection to sensitive land uses.

The *Waste Management Policy (Siting, design and management of landfills)* contains specific requirements as to where landfills may be established. This policy also includes requirements related to the segregation of wastes and the minimum distance between landfill cells and the groundwater table underneath them.

Further, the policy states that landfill sites must not be established or extended into any area where an aquifer contains Segment A⁴ (potable) groundwater, unless:

- the landfill operator satisfies EPA that sufficient additional design and management practices will be implemented
- EPA determines that regional circumstances exist that warrant the development of a landfill in the area.

And, regardless of the underlying Segment, all new landfill sites must deposit waste at least two metres above the long-term undisturbed depth to groundwater, unless:

- the landfill operator satisfies EPA that sufficient additional design and management practices will be implemented
- EPA determines that regional circumstances exist that warrant the development of the landfill.

3.2 Landfill cell design

This subsection details suggested measures for landfill design for the different types of Category C waste. New BPML cells should be designed in accordance with the suggested measures appropriate to the type of wastes to be accepted in that cell. All cells should be designed to operate for the minimum period of time.

4 Segment A groundwater is defined in the *State environment protection policy (Groundwaters of Victoria) 1997*. Segment A groundwater has total dissolved solids between 0 and 1000 mg/L and is therefore suitable for human consumption.

The BPEM suggests that cells should be filled within two years.

Alternatives to the landfill designs described below may be approved, provided EPA is satisfied that the alternative provides at least an equivalent environmental outcome to the BPEM's suggested measures. In considering alternative designs, EPA will also take into account the volumes and types of wastes accepted, plus the hydrogeological and weather conditions at the site.

3.2.1 Asbestos

Each cell within a BPML that is to accept asbestos as the only PIW must be designed in accordance with the BPEM requirements for a Type 3 landfill. This type of landfill cell may also accept solid inert waste. The design should include the following suggested measures:

- a leachate collection system comprising not less than 300 mm thick gravel, or other approved drainage material, placed over the liner with leachate collection pipes and a leachate extraction system
- a liner consisting of compacted clay not less than 1 m thick with hydraulic conductivity not more than 1×10^{-9} m/s, or other approved mineral layer.

If other wastes that are placed in the same cell as asbestos present a higher risk to underlying groundwater than asbestos, then a higher level of cell design is required.

3.2.2 Food processing and low-hazard PIW, and Category C contaminated soil

Each cell within a BPML that is to accept food processing waste, low-hazard PIW or Category C contaminated soil⁵ must be designed in accordance with the BPEM requirements for a Type 2 landfill and consist of at least a composite barrier liner and leachate collection system. The cell design should include the following suggested measures:

- a leachate collection system comprising not less than 300 mm thick gravel, or other approved drainage material, placed over the composite liner with leachate collection pipes and a leachate extraction system
- a composite liner consisting of HDPE membrane, or other approved geomembrane, and compacted clay not less than 1 m thick with hydraulic conductivity not more than 1×10^{-9} m/s, or other approved mineral layer
- geotextiles to protect the geomembrane and the leachate collection layer.

3.2.3 Category C immobilised waste

Each cell within a BPML that is to accept Category C immobilised waste must include at least primary (upper) and secondary (lower) composite liners, and primary and secondary leachate detection and collection systems. The cell design should include the following suggested measures:

- a primary leachate collection system comprising not less than 300 mm thick gravel, or other approved drainage material, placed over the primary composite liner with collection pipes and an extraction system
- a primary composite liner consisting of HDPE membrane, or other approved geomembrane, and compacted clay not less than 1 m thick with hydraulic conductivity not more than 1×10^{-9} m/s, or other approved mineral layer
- a secondary leachate detection and leachate collection system comprising not less than 300 mm thick gravel, or other approved drainage material, placed over the secondary composite liner with collection pipes and an extraction system
- a secondary composite liner consisting of HDPE membrane, or other approved geomembrane, and compacted clay not less than 1 m thick with hydraulic conductivity not more than 1×10^{-9} m/s, or other approved mineral layer
- geotextiles to protect the geomembranes and the leachate detection and collection layers.

The minimum cell design requirements of the BPEM and these guidelines are summarised in Table 1.

3.2.4 Management of gaseous emissions

Gaseous emissions must be managed through appropriate design, including gas capture and treatment if required. The BPEM and EPA publication 722, *Environmental guidelines for reducing greenhouse gas emissions from landfills and wastewater treatment facilities*, provide more detail on the management of landfill gas emissions.

3.2.5 Landfill cap

Once a cell within a BPML is filled with waste, it must be capped and rehabilitated. The design of a cap should be consistent and compatible with the suggested measures for basal liner systems described above. The cap should be designed so that the anticipated seepage rate through the cap is no more than 75 per cent of the anticipated seepage rate through the liner.

⁵ Where soils are immobilised to category C they are considered 'Category C immobilised waste' (see section 3.2.3)

Table 1: Minimum cell design requirements

Minimum cell design	Wastes accepted
Type 3 landfill ⁶	Asbestos Solid inert waste
Type 2 landfill	Putrescible ⁷ Category C PIW (e.g., from food processing) Low-hazard PIW Category C contaminated soil Municipal solid waste
Double composite liner or equivalent	Category C immobilised waste

⁶ Type 2 and Type 3 landfills are defined in the BPEM.

⁷ Putrescible waste is waste that can be decomposed by bacterial action and includes components of municipal/kerbside-collected waste and food processing wastes. The leachate produced by the decomposition of putrescible waste might mobilise metals and other contaminants found in other wastes, and thereby reverse the immobilisation process.

For Category C immobilised waste cells, the cap seepage should be no more than 75 per cent of the seepage rate through the primary composite liner (the liner in contact with waste).

3.3 Construction quality assurance plan

Prior to the construction of a new landfill cell, the landfill operator of a BPML must develop a Construction quality assurance ('CQA') plan for EPA approval. The CQA plan is designed to ensure that the landfill is constructed in accordance with EPA-approved design specifications.

An environmental auditor appointed under the Act must prepare an environmental audit report. That report must include a review of the approved plans and specifications, and confirm that the landfill cell has been constructed in accordance with the approved CQA plan. Category C PIW must not be placed in the landfill cell until the environmental audit report has been submitted to and approved by EPA.

3.4 Waste disposal

BPML operators must ensure that any Category C PIW with specific disposal requirements is identified, then use appropriate disposal methods⁸.

For a cell to be suitable to accept a particular waste, it must meet the minimum design requirements for that waste, as defined in Table 1. Also, the waste must be compatible with other wastes in the cell. See Table 2 for suggested waste co-disposal options. These options will be assessed and specified for individual landfills through works approval and licensing.

For example, putrescible wastes may not be disposed of in the same cell as Category C immobilised waste.

⁸ Specific disposal requirements will need to be assessed on a case-by-case basis to ensure, for example, that chromium waste is not placed with any waste that may result in the formation of the more hazardous chromium (VI). Situations where this may occur will need to be identified and an appropriate disposal methodology developed.

This restriction prevents contact between the immobilised waste and the leachate produced by putrescible waste decomposition, which could mobilise metals and other contaminants and thus reverse the waste immobilisation process.

Low-hazard PIW and Category C contaminated soil may be placed in the same cell as Category C immobilised waste – provided that the landfill is licensed to accept these wastes and EPA assesses these wastes as compatible.

Category C food processing wastes may be deposited with other putrescible wastes, such as municipal waste, if the landfill is licensed to accept these wastes and the cell design meets BPML requirements.

3.5 Waste receipt

A BPML must be operated in accordance with an environment improvement plan ('EIP') that has been approved by EPA. The EIP must include procedures for adequate supervision, control of waste receipt, safe handling, record-keeping and placement of each sub-category of Category C PIW in accordance with the relevant waste-specific requirements.

Waste receipt procedures should include the following:

- pre-receipt procedures
- inspections and sampling of waste loads
- staff training requirements
- procedures to deal with the management of non-conforming wastes
- quality control, auditing provisions and reporting.

Waste generators and/or treaters must give the landfill operator testing results to demonstrate that their waste is of a type that the operator's licence permits the landfill to accept.

For certain types of waste, the landfill operator will need to undertake a sampling program for a proportion of incoming waste loads, to validate the

Table 2: Co-disposal of Category C wastes

Category C subcategory	Wastes which may be co-disposed				
	Asbestos	Putrescible (e.g., food processing)	Contaminated soil	Low-hazard PIW	Immobilised waste
Asbestos		✓	✓	✓	✓
Putrescible (e.g. food processing)	✓	✓	✓	✓	X
Contaminated soil	✓	✓	✓	✓	✓
Low-hazard PIW	✓	✓	✓	✓	✓
Immobilised waste	✓	X	✓	✓	

‘✓’ = permitted ‘X’ = not permitted

supplied waste testing results. In accordance with the *Environment Protection (Prescribed Waste) Regulations 1998* (as amended or replaced from time to time), completed waste transport certificates must also accompany all loads of waste delivered to the landfill.

Landfill operators must regularly conduct audits to assess their waste receipt practices against an EPA-approved EIP. In some cases, an independent body may be required to conduct these audits. How frequent and detailed the audit should be will depend on the risk posed to the environment, plus the volumes and types of waste accepted at the landfill. The frequency and scope will be agreed between EPA and the operator.

A BPML must be staffed at all times when it is open for the receipt of waste. A gatehouse is required to ensure that waste receipt procedures can be properly implemented (for example, by providing facilities for the storage of relevant documents and waste samples). All BPMLs in the metropolitan area or a major rural centre (as listed in Schedule C to the Act) must have a weighbridge. A weighbridge is required so that the amount of all waste accepted at the landfill can be accurately measured and recorded.

3.6 Monitoring

The operation, maintenance and post-closure care of a landfill accepting Category C PIW must be monitored so that the environmental performance of the landfill can be assessed and reported to EPA and the wider community. Monitoring should include the following suggested measures:

- monitoring of leachate, groundwater and air quality
- monitoring of surface water and landfill gas if relevant to the landfill and/or the wastes placed in the landfill
- documentation of monitoring procedures in the landfill EIP.

Landfill operators intending to accept Category C immobilised waste might need to do more monitoring than those accepting other types of Category C PIW. This additional monitoring must be appropriate to the risk posed by Category C immobilised waste.

A BPML operator must engage an environmental auditor appointed under the Act to prepare environmental audit reports on a regular basis to assess the risk of harm or detriment to the environment, with particular focus on groundwater beneath the landfill, as well as assessing monitoring practices against the EPA-approved EIP. The appropriate frequency and scope of the audit reports depend on the risk posed to the environment, plus the volumes and types of waste accepted at the landfill, and will be agreed between EPA and the landfill operator.

3.7 Reporting

A BPML operator must prepare an annual report in accordance with licence requirements. This report will be provided in two parts, Part A being the ‘annual environmental performance report’ in accordance with clause 12(4) of the IWMP (PIW), with Part B reporting on any other licence requirements.

3.8 Community involvement

A BPML operator must consult with the community about its intent to accept Category C PIW. The community includes interested local residents and businesses, and may also include residents or businesses from outside the local area with an interest in the landfilling of these wastes. Where there is sufficient community interest, a community liaison committee should be established (if not already in existence), and it should meet at least twice yearly.

The operator of a BPML must regularly report to the community on, amongst other things, the performance of the landfill in general and the acceptance of Category C PIW in particular, plus any other issue of

interest to the community. This reporting could be via regular meetings of the community liaison committee, newsletters and/or any other method agreed to with the community.

3.9 Financial assurance

Under the Act, all licensed landfill operators must have in place or provide to EPA an adequate financial assurance. The level of financial assurance must be appropriate to the risk posed by the wastes to be accepted at the landfill.

4. MANAGEMENT OF LANDFILLS ACCEPTING CATEGORY C WASTES UNDER PREVIOUS REQUIREMENTS

Any operator of a landfill that accepts Category C PIW who has not yet met the additional specific requirements in these Guidelines must do so by progressively improving landfill cell design and/or management systems. EPA will work with those operators to ensure that they implement the required improvements. If EPA decides that a landfill requires a specified time frame to meet best practice requirements, it may amend the licence accordingly.

Operators of landfills licensed under the pre-1 July 2007 regime to accept PIWs may continue to accept the wastes concerned. But any landfill operator intending to accept a new Category C waste stream must submit a works approval application for EPA to assess against the BPML requirements. If EPA grants the works approval, it will in due course amend the licence accordingly.

Best practice requirements must be incorporated into the design and construction of all new cells, and new landfill caps of existing cells. The EIP and management systems, including those related to waste receipt and monitoring, must be reviewed, updated and implemented in line with best practice requirements at the next EIP review or within 12 months of the release of these Guidelines – whichever is sooner.

5. SUMMARY OF BEST PRACTICE REQUIREMENTS

The general and best practice requirements for landfills, including those accepting Category C PIWs, are outlined in:

- *Industrial Waste Management Policy (Prescribed industrial waste)*
- *Waste Management Policy (Siting, design and management of landfills)*
- *Best practice environment management: Siting, design, operation and rehabilitation of landfills.*

The 2008 guidelines build on the above requirements and specify additional requirements for those landfills accepting Category C PIWs. These requirements are as follows:

- If a landfill operator intending to accept Category C PIW proposes a measure that is an alternative to a BPEM suggestion, the operator must satisfy EPA that the alternative will provide at least an equivalent environmental outcome.
- The operator must consult with the community about any proposal to accept Category C PIW and establish a community liaison committee where there is sufficient community interest.
- Each cell within a BPML that is to accept food processing waste, low-hazard PIW or Category C contaminated soil must consist of at least a single composite barrier liner and a leachate collection system.
- Each cell within a BPML that is to accept Category C immobilised waste must include at least primary and secondary composite liners, and primary and secondary leachate detection and collection systems.
- Each cell cap must be designed so that seepage through the cap is no more than 75 per cent of the anticipated seepage rate through the primary liner, and the design of a cap should be consistent and compatible with the landfill cell's basal liner.
- An EPA-appointed auditor must prepare an environmental report that includes a review of the approved plans and specifications and confirmation that each landfill cell has been constructed in accordance with the approved CQA plan.
- Putrescible wastes may not be disposed of in the same cell as Category C immobilised waste.
- A BPML must be staffed at all times when it is open for the receipt of waste.
- The landfill must operate in accordance with an EPA-approved EIP that includes procedures for adequate supervision, control of waste receipt, safe handling, record-keeping and correct placement of each subcategory of Category C PIWs.
- The operator must conduct regular audits of the waste receipt procedures against the EPA-approved EIP, and in some cases engage an independent body to conduct these audits.

For further information on the disposal of prescribed waste, contact:

Prescribed Waste Team
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GPO Box 4395QQ
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