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## Waste acceptance at landfills

Guidance on waste acceptance procedures and criteria

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# Foreword

This guidance is for waste producers, waste managers, landfill operators and our staff. It explains the practical implications of the Landfill Directive on waste acceptance at landfills. It highlights some of the issues you should consider when deciding if landfill is the best management option for your waste and explains what you need to do to comply with the waste acceptance procedures and criteria if you decide it is.

This document expands upon guidance provided by Defra/WAG (Environmental Permitting Guidance on the Landfill Directive, version 3.1, updated March 2010).

This version\* has been updated in the light of regulatory changes and experience.

\*This document was previously known as Guidance for wastes destined for disposal in landfills - Interpretation of the Waste Acceptance Requirements of the Landfill (England and Wales) Regulations (as amended)'.

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# 1 Introduction

## 1.1 Purpose of this guidance

The Landfill Directive sets rigorous standards to reduce both our reliance on landfill and the environmental impact of wastes disposed of by landfill. Tighter operational and infrastructure standards limit the types and nature of waste that we can send to landfill and place greater restrictions on the location of landfill sites.

The key points are:

- Certain kinds of waste cannot be landfilled.
- Landfills are classified according to whether they can accept hazardous, non-hazardous or inert wastes.
- Wastes can only be accepted at a landfill if they meet the waste acceptance criteria (WAC) for that class of landfill.
- Most wastes must be treated before you can send them to landfill.
- There are formal processes for identifying and checking wastes you must follow before wastes can be accepted at a landfill site.

The legal provisions dealing with these points are in the Environmental Permitting (England and Wales) Regulations 2010 (as amended) (EP Regulations), the Landfill Directive (1999/31/EC) and the Council Decision (2003/33/EC).

These have the detailed requirements for:

- the granting of landfill permits and their engineering, operation, closure and aftercare;
- landfill charges and financial security;
- the diversion of biodegradable municipal wastes away from landfill.

These provisions have a significant impact on how we manage wastes. This guidance document is to help waste producers, landfill operators and our staff to understand the requirements. However, the guidance will be of use to anyone with an interest in waste legislation. It provides important information relevant to any waste destined for disposal to landfill. Landfill sites should only be used once alternative options for managing waste have been considered and discounted, because as well as the requirements of the direct legislation there are additional pressures limiting waste to landfill.

We have separate guidance on the pre-treatment of wastes for landfill<sup>1</sup>.

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<sup>1</sup> Environment Agency 2011 – Treatment of waste for landfill – November 2011  
<http://publications.environment-agency.gov.uk/pdf/GEHO1111BVDF-E-E.pdf>

## 1.2 The wider context

This guidance sets out what wastes may be accepted for disposal in landfills. However, please remember the wider context for managing waste. In particular:

- Consider whether landfill is the most appropriate waste management option under the Waste Framework Directive and Government policy.
- Consider practical issues such as the cost and availability of both treatment and landfill options. The 'landfill tax escalator' (£8 per year) is set to continue until at least 2014.
- Don't just consider how to treat the waste before landfill. It makes sense to look at the whole chain of production and waste management.

If the waste comes from an installation regulated under the IPPC Directive (that is, it is an installation under the EP Regulations), these principles are reinforced as legal requirements. You must operate your installation in a way that avoids the production of waste and find a use for waste that is produced unless this is not technically and economically possible.

The recently revised Waste Framework Directive (2008/98/EC) highlights more strongly than ever the need to consider the waste hierarchy when deciding what to do with your wastes.

# 2 Overview

## 2.1 Waste acceptance procedures and criteria

The Landfill Directive places controls on waste disposal. These controls include requirements to follow the waste acceptance procedures and criteria that have been agreed by the Council of the European Union and are laid out in Council Decision 2003/33/EC.

Before a waste can be accepted at a landfill site, the landfill operator must be satisfied that the waste meets his permit conditions, the waste acceptance procedures (WAP) and waste acceptance criteria (WAC). If you decide that disposal to landfill is the best management option for your waste, you must follow these procedures or the operator may refuse to accept your waste.

Figures 1 and 2 (on pages 9 and 10) show at what stage hazardous waste assessment and WAC testing are required (please read in conjunction with the notes on page 8).

Table 2.1 (page 11) provides an overview of the main landfill options that are available. Please read in conjunction with Section 7.

### 2.1.1 Waste acceptance procedures

The Council Decision lays down waste acceptance procedures (WAP). From this foundation landfill operators should build their own site-specific WAP. The Council Decision WAP must be used to determine whether a waste is suitable to go to landfill, and if so, to which class of landfill. The WAP consist of three steps to identify and periodically check the main characteristics of the waste (see Section 9):

**Level 1: basic characterisation.** Before you can send a load of waste to landfill, you need to know its composition and properties so you can determine whether it is suitable for acceptance and at which class of site (see the Council Decision Annex, paragraph 1.1),

**Level 2: compliance testing.** If you produce waste that is 'regularly arising', e.g. from an industrial process, you must periodically check the waste to ensure that those properties have not changed (see the Council Decision Annex, paragraph 1.2),

**Level 3: on-site verification.** The operator must check each delivery at the landfill to verify that it is the expected waste and that it has not been contaminated in storage or transport (see the Council Decision Annex, paragraph 1.3).

As well as WAP, all waste holders have a Duty of Care<sup>2, 3</sup>. This means that you must:

- take all reasonable measures to prevent a breach of any legislation, including permit conditions;
- make sure that your waste is contained and does not escape your control;
- pass on a written 'waste description' with the waste which others will need to avoid a breach of legislation. The 'basic characterisation' summarised above will fulfil this obligation; and
- pass on a waste 'transfer note' with the waste (includes use of a season ticket where appropriate). The Environmental Protection (Duty of Care) Regulations 1991 require that transfer notes use the List of Wastes Regulations<sup>4</sup> to identify wastes.

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<sup>2</sup> Environmental Protection Act 1990, Section 34

<sup>3</sup> <http://www.environment-agency.gov.uk/netregs/63197.aspx>

<sup>4</sup> List of Wastes (England) Regulations 2005 and List of Wastes (Wales) Regulations 2005

## 2.1.2 Waste Acceptance Criteria

The Council Decision specifies waste acceptance criteria for inert, non-hazardous and hazardous waste. These are:

- a list of wastes which may be accepted at a landfill for inert waste without testing;
- limits on the leachability of certain parameters; and
- limits on the organic content of the waste.

There are no numerical WAC limits on landfills for non-hazardous waste.

In many cases, wastes will need to be sampled and tested to check they are within the limits.

### 2.1.2.1 WAC and Hazardous Waste Assessment

**The WAC limits can not be used to make an assessment of whether a waste is hazardous. These are for a different purpose and must not be confused.**

The List of Wastes Regulations implement the European Waste Catalogue and you should use these Regulations as a starting point in the determination of whether a waste is hazardous. The definition of hazardous waste comes from the Hazardous Waste Regulations<sup>5</sup>. They contain three types of entry:

- **Absolute hazardous entries.** These wastes are deemed to be hazardous, regardless of their composition or concentrations of dangerous substances in them.
- **Mirror entries.** These wastes may be hazardous or non-hazardous, according to the concentration of dangerous substances in them.
- **Absolute non-hazardous entries.** These wastes are deemed to be non-hazardous.

As a waste producer you will need to characterise your waste for the Duty of Care description whether or not you intend to send it to landfill. This will include making an assessment of its hazardousness (that is, is it hazardous waste or not) unless it is an absolute non-hazardous entry waste. You do this by reference to the List of Waste Regulations and our detailed guidance on the interpretation of the definition and classification of hazardous waste<sup>6</sup>. This includes an assessment of the composition of the waste.

### 2.1.3 Special Provisions

There are also a number of special provisions. These relate to:

- stable, non-reactive hazardous wastes deposited in landfills for non-hazardous wastes, in cells not used for the deposit of biodegradable wastes;
- asbestos wastes;
- gypsum wastes;
- underground storage.

Details of the criteria for each type of waste are set out in Sections 4-7.

Section 12 provides some background to the development of the waste acceptance criteria.

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<sup>5</sup> The Hazardous (England and Wales) Regulations 2005 (as amended) and the Hazardous Waste (Wales) Regulations 2005 (as amended)

<sup>6</sup> Environment Agency, 2008, *Hazardous waste. Interpretation of the definition and classification of hazardous waste*. Technical guidance WM2, Second Edition, version 2.2. Update note issued August 2009. See <http://www.environment-agency.gov.uk/business/topics/waste/32200.aspx>

## 2.2 Leaching limit values

The leaching limit values relate to specific leaching tests (discussed in Section 8). The limits and tests are different for granular and monolithic wastes. For monolithic waste, blocks of the waste of specified dimensions are held in a tank of eluate for a period of time. The leaching of constituents is a function of the surface area of a monolith. The results are specified as milligrams per square metre. Note: monolithic wastes can be crushed and tested as granular waste using the granular waste limits.

## 2.3 Definition of monolithic and granular wastes

A monolithic waste is a waste that has been deliberately treated to solidify it and strongly bind it.

Granular wastes include all wastes that are not monolithic (Council Decision.)

## 2.4 Summary of requirements for waste producers

Before a waste producer can take waste to a landfill site for disposal, they need to check the landfill site has the appropriate permit<sup>7</sup> and must have completed the following:

- Duty of care transfer note/Hazardous Waste consignment note
- Pre-treatment declaration form<sup>8</sup>
- Basic characterisation of the waste, to include:
  - Description of the waste
  - Waste code (using List of Wastes)
  - Composition of the waste (by testing, if necessary)
  - WAC testing (if required)

These are considered in more detail in the following chapters. If you are still uncertain whether your waste requires testing you should contact your waste manager or laboratory.

The flowchart (Figure 1) shows the stages in the assessment of waste for disposal by landfill

### Notes to Figure 1

[1] The Council Decision lists materials that are deemed to be inert and may be accepted at a landfill for inert waste without testing if they are not contaminated in any way (see Section 4).

[2] For hazardous waste to be deposited in a stable non-reactive hazardous waste cell at a landfill for non-hazardous waste it must be stable and non-reactive, as defined in the Council Decision (see Section 7).

[3] The waste does not have to be tested against these criteria if the holder intends to regard the waste as non-hazardous. The criteria will only be relevant if the holder expects to demonstrate that the waste is inert.

[4] Non-hazardous wastes can be disposed of in the same cells as stable, non-reactive hazardous wastes; if they meet the same waste acceptance criteria (see Section 7.1).

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<sup>7</sup> <http://www.businesslink.gov.uk/bdotg/action/detail?itemId=1087147950&type=RESOURCES>

<sup>8</sup> Environment Agency, 2011, Treatment of waste for landfill – November 2011 <http://publications.environment-agency.gov.uk/pdf/GEHO1111BVDF-E-E.pdf>

Figure 1

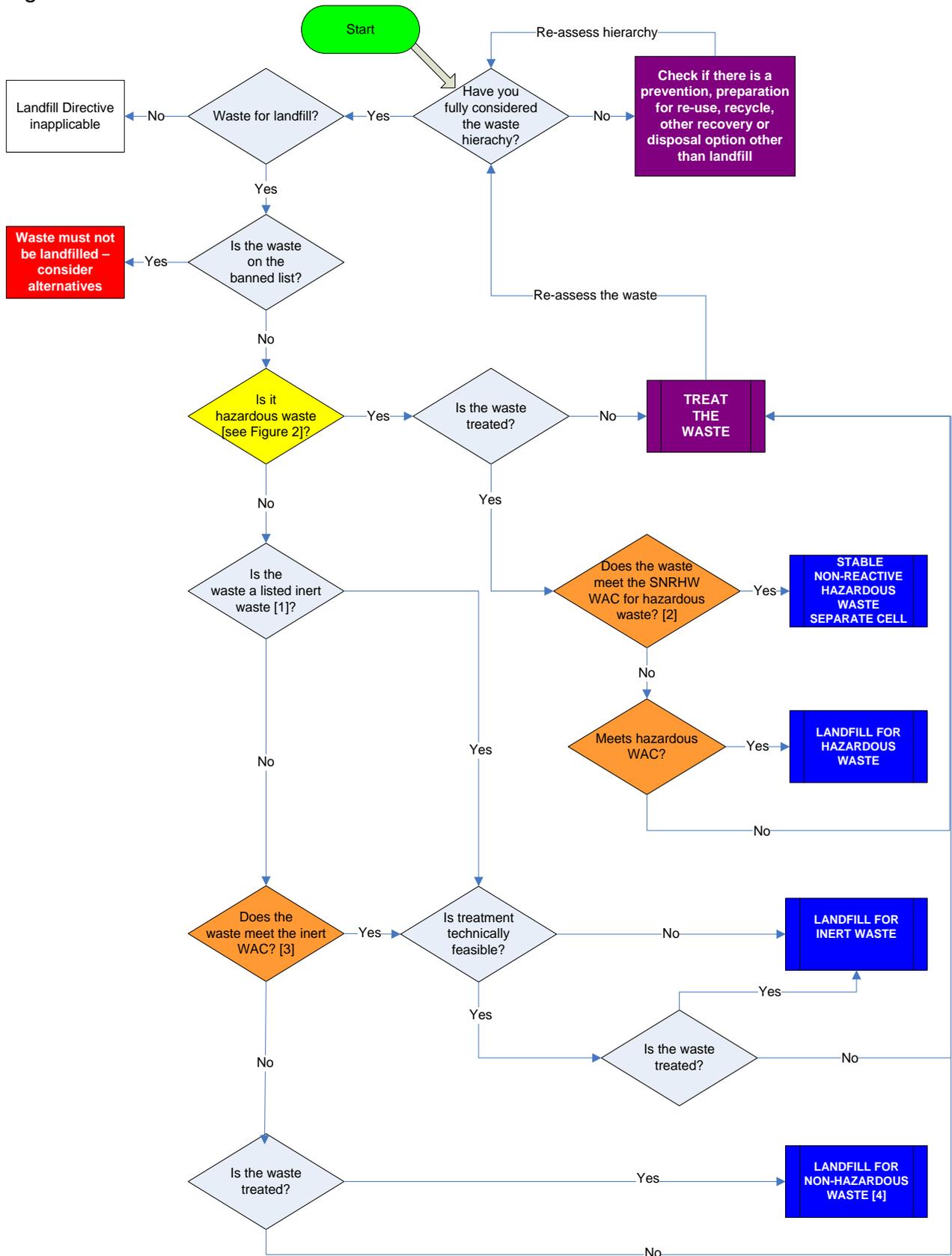


Figure 2 Is it hazardous waste?

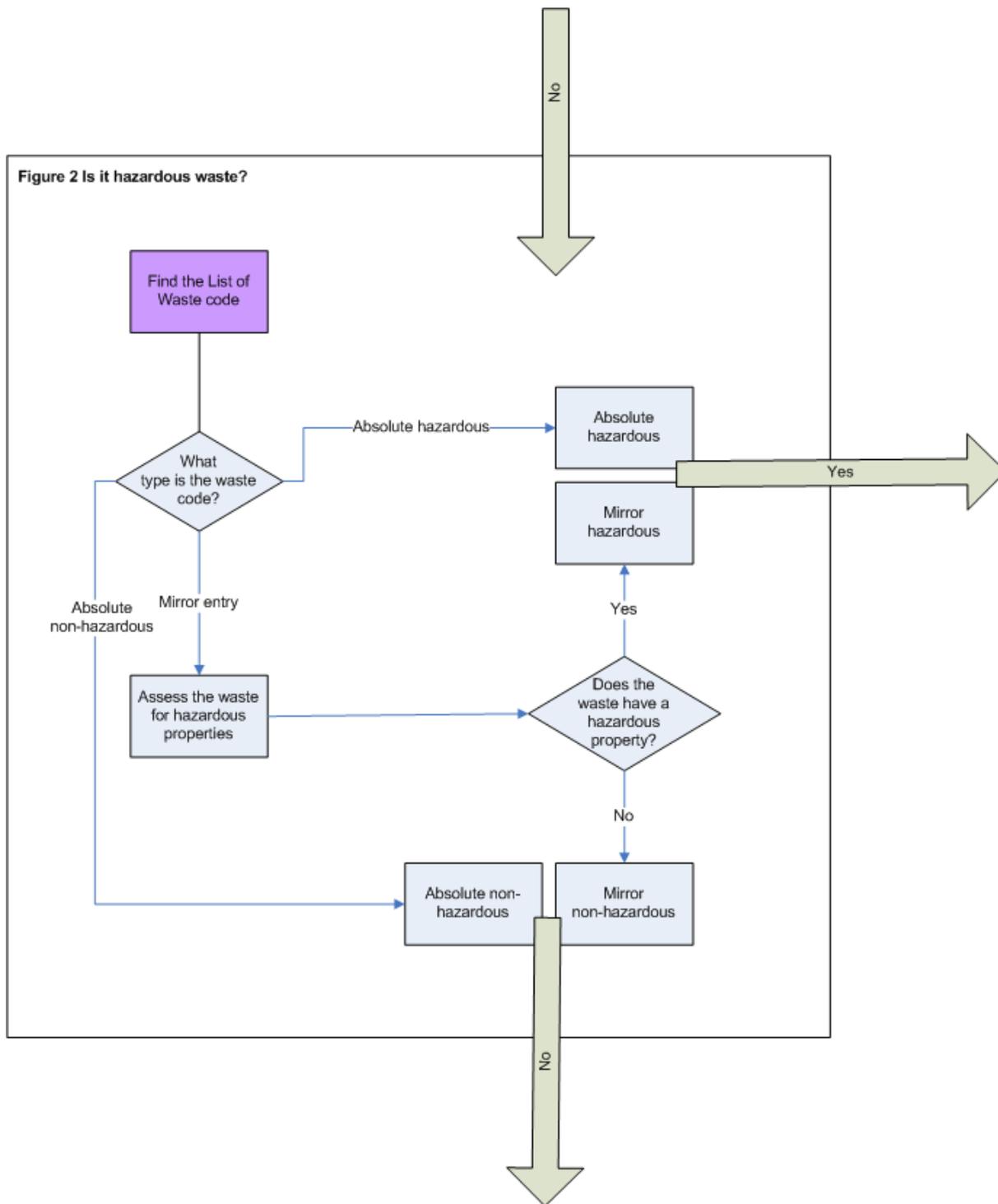


Table 2.1: Overview of main landfill options provided

Site class	Sub-class	Waste types acceptable*
Hazardous		<ul style="list-style-type: none"> <li>granular hazardous waste that meets WAC</li> <li>monolithic hazardous waste that meets WAC</li> <li>inert waste for cover and engineering only</li> </ul>
Hazardous	Asbestos (defined area)	<ul style="list-style-type: none"> <li>asbestos waste displaying no other hazards</li> <li>asbestos waste including where it displays other hazards</li> <li>inert waste for cover and engineering only</li> </ul>
Hazardous	Underground storage	<ul style="list-style-type: none"> <li>wastes shown to be acceptable by the site-specific risk assessment (but not wastes listed as excluded). See Section 7.4</li> </ul>
Non-hazardous		<ul style="list-style-type: none"> <li>municipal waste</li> <li>wastes not listed as hazardous in the List of Waste Regulations</li> <li>mirror entry wastes that do not exhibit hazardous properties</li> <li>inert waste</li> </ul>
Non-hazardous	SNRHW cell (stable non-reactive hazardous waste)	<ul style="list-style-type: none"> <li>SNRHW that meets WAC</li> <li>non-hazardous waste that meets the WAC for SNRHW, including wastes with a high gypsum or other sulphate content</li> <li>inert waste</li> </ul>
Non-hazardous	Asbestos cell	<ul style="list-style-type: none"> <li>asbestos waste displaying no other hazards</li> <li>inert waste for cover and engineering only</li> <li>other suitable materials, for example, non-hazardous wastes with a high gypsum or other sulphate content (see Sections 7.2/7.3)</li> </ul>
Non-Hazardous	Gypsum cell	<ul style="list-style-type: none"> <li>waste with a high gypsum (or other sulphate) content that meet the total organic carbon (TOC) and dissolved organic carbon (DOC) WAC for SNRHW — see Section 7</li> <li>inert waste for cover and engineering only</li> </ul>
Non-hazardous	Underground storage	<ul style="list-style-type: none"> <li>non-biodegradable wastes not listed as hazardous in the List of Waste Regulations — provided that they are shown to be acceptable by the site-specific risk assessment and are not listed as excluded. See Section 7.4.</li> </ul>
Non-hazardous	Underground storage: SNRHW cell	<ul style="list-style-type: none"> <li>SNRHW that meets WAC</li> <li>non-hazardous waste that meets the WAC for SNRHW, including wastes with a high gypsum or other sulphate content</li> <li>inert waste</li> </ul> <p>All these must be shown to be acceptable by the site-specific risk assessment and not listed as excluded</p>
Non-hazardous	Underground storage Asbestos cell	<ul style="list-style-type: none"> <li>asbestos waste displaying no other hazards</li> <li>inert waste for cover and engineering</li> </ul> <p>Both these must be shown to be acceptable by the site-specific risk assessment and not be listed as excluded</p>
Inert		<ul style="list-style-type: none"> <li>inert waste listed as acceptable without testing</li> <li>wastes that meet inert WAC</li> </ul>
Inert	Underground storage	<ul style="list-style-type: none"> <li>inert waste listed as acceptable without testing</li> <li>wastes that meet inert WAC</li> </ul>

\* Wastes must not be prohibited wastes. They are also subject to the legal requirement for treatment.

# 3 Banned wastes

You cannot send the following types of waste to landfill sites:

- liquid waste;
- waste which in a landfill would be explosive, corrosive, oxidising, flammable or highly flammable;
- hospital and other clinical wastes – from medical or veterinary establishments – which are infectious;
- chemical substances from research and development or teaching activities (such as laboratory residues) which are not identified or which are new, and whose effects on man and/or the environment are not known;
- whole and shredded used tyres – apart from tyres used as engineering material, bicycle tyres, and tyres with an outside diameter of more than 1,400 mm.

We describe these types of waste in the following sub-sections:

## 3.1 Liquid wastes

Waste in liquid form is:

- (i) any waste that flows near instantaneously into a hollow in the surface of the waste; or
- (ii) any waste load containing a free-draining liquid substance that is more than 250 litres or 10% of the load volume, whichever represents the lesser amount. The term free draining means a liquid as defined in (i), irrespective of whether that liquid is in a container.

If a waste is not liquid (as defined by (i) above) it must be a sludge, or solid. This practical test is most relevant for fine-grained, homogeneous wastes such as filter-cakes, sewage sludge and road-gully silts. A waste that flows only slowly, rather than near instantaneously, into a hollow will be a sludge or a fine-grained solid – it is therefore not prohibited.

If you know (or it's reasonable to suppose) that there are small amounts of liquid in a generally solid waste, criterion (ii) must be used. For example, cartons of milk or juice in mixed commercial waste, or, liquids accidentally added to the waste. This would include liquid that has drained or been squeezed from components of the waste, and rainwater that has fallen into the waste container.

Leachate and landfill gas condensate produced by a landfill site: in our view these have not been 'accepted' at that landfill site for disposal, rather they have 'arisen' on site. Therefore they can be managed in accordance with the landfill permit (for example, leachate can be re-circulated if the permit allows it). However, leachate produced at another landfill can not be accepted for re-circulation as this would be accepting a liquid waste for disposal.

## 3.2 Prohibited hazards

### 3.2.1 Explosive, corrosive, oxidising, highly flammable or flammable

The Directive definitions of explosive, corrosive, oxidising, highly flammable and flammable are those we use for the purposes of the Hazardous Waste Regulations<sup>9</sup> and the List of Waste Regulations.

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<sup>9</sup> The Hazardous (England and Wales) Regulations 2005 (as amended) and the Hazardous Waste (Wales) Regulations 2005 (as amended)

We have issued guidance on how to assess hazardous wastes<sup>10</sup>. For information on assessing the hazardous properties of a waste, refer to Appendix C of that guidance and in particular to sections:

- C1: explosive
- C4: irritant and corrosive
- C2: oxidising
- C3: flammable and highly flammable.

### 3.2.2 Infectious and other healthcare wastes

The definition of infectious for the purpose of hazardous waste has changed from that previously used in the Special Waste Regulations. Please refer to Appendix C9 of the guidance (WM2) for the revised interpretation.

Infectious wastes are prohibited only if they are 'hospital and other clinical wastes which arise from medical or veterinary establishments'. This does not mean that infectious wastes from other sources, or indeed other clinical or healthcare wastes, should be sent to landfill. The Safe Management of Healthcare Waste<sup>11</sup> provides the additional guidance on the appropriate mechanisms for disposing of clinical and related waste streams. Note that this document is under review.

Landfills for non-hazardous waste must not accept those clinical and related wastes which are infectious. Such wastes can come from medical or veterinary establishments. Landfills for non-hazardous waste can only accept such wastes if they have been treated and display no other hazards. Our technical guidance on clinical waste management (EPR 5.07<sup>12</sup>) looks at the treatment for certain clinical waste streams.

Some non-infectious healthcare waste streams are potentially suitable for landfill, for example, some (but not all) non-clinical offensive-hygiene wastes classified under 18 01 04, 18 02 03 and 20 01 99. These must be pre-treated in accordance with the Landfill Directive (see Section 10).

Other healthcare wastes (and similar wastes from municipal and manufacturing) including waste pharmaceuticals, sharps and body parts, organs and blood preserves must not be landfilled.

### 3.3 Unknown chemical substances

Article 5(3)(c) of the Landfill Directive refers to the ban on waste falling within category 14 (Annex 1A) of the Hazardous Waste Directive. This is:

- chemical substances arising from research and development or teaching activities which are not identified and/or are new, and whose effects on man and/or the environment are not known

Waste cannot be accepted at landfill if its properties are unknown. It will also not meet the requirements for basic characterisation as discussed in Section 8.

### 3.4 Whole used tyres and shredded tyres

Whole and shredded tyres are banned from disposal at landfills. Bicycle tyres and tyres with an outside diameter of above 1,400 mm are excluded from the ban.

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<sup>10</sup> Environment Agency, 2008, *Hazardous waste. Interpretation of the definition and classification of hazardous waste*. Technical guidance WM2, Second Edition, version 2.2. Update note issued August 2009. See <http://www.environment-agency.gov.uk/business/topics/waste/32200.aspx>

<sup>11</sup> Department of Health, 2006, *Safe Management of Healthcare waste*. Health Technical Memorandum HTM 07 01 , , ISBN 0 7176 2492 7.

<sup>12</sup> Environment Agency, July 2010, *How to comply with your environmental permit: Additional guidance for Clinical Waste (EPR 5.07)*. See <http://www.environment-agency.gov.uk/business/sectors/39737.aspx>

Whole used and shredded tyres may only be accepted as engineering material if this is allowed by the permit and the tyres are used in accordance with the requirements of the permit.

If your permit allows it, you may accept bicycle tyres, or tyres with an outside diameter greater than 1,400 mm at your landfill for non-hazardous waste.

### **Engineering material**

Operators wishing to use whole or shredded tyres as engineering material should refer to the following document:

Guidance on the use of tyres for leachate drainage blankets on Landfill sites<sup>13</sup> – this is an interim guidance note intended to provide regulatory consistency in the design and construction of these engineering structures. It is specifically for the use of whole or, shredded tyres proposed as Used Tyre Derived Aggregate Replacements (UTDAR).

Other guidance documents relating to the re-use of shredded tyres and tyres are:

PAS 107 covering tyre shred and crumb products<sup>14</sup>, PAS 108 for the production of used tyre bales<sup>15</sup> and Quality Protocol: Tyre-derived rubber materials. End of waste criteria for the production and use of tyre-derived rubber materials<sup>16</sup>.

Pending the outcome of the Waste Protocols project work on when tyre bales can cease to be waste, we will put a regulatory position statement (RPS)<sup>17</sup> in place that allows the use of PAS 108 tyre bales in civil engineering and landfill operations without a permit. Where the use of PAS 108 tyre bales in landfill engineering has been notified to us and we are satisfied that the requirements of the RPS will be met, we will not to pursue a permit application or variation for their storage and use in landfill engineering.

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<sup>13</sup> Recommendations for aggregate leachate drainage layers, Final version 2, 29/06/07

<sup>14</sup> See [http://www.wrap.org.uk/recycling\\_industry/information\\_by\\_material/tyres/pas\\_107.html](http://www.wrap.org.uk/recycling_industry/information_by_material/tyres/pas_107.html)

<sup>15</sup> See [http://www.wrap.org.uk/recycling\\_industry/information\\_by\\_material/tyres/pas\\_108.html](http://www.wrap.org.uk/recycling_industry/information_by_material/tyres/pas_108.html)

<sup>16</sup> [http://www.environment-agency.gov.uk/static/documents/Business/Quality\\_protocol\\_for\\_tyre-derived\\_rubber\\_materials\\_.pdf](http://www.environment-agency.gov.uk/static/documents/Business/Quality_protocol_for_tyre-derived_rubber_materials_.pdf)

<sup>17</sup> See <http://www.environment-agency.gov.uk/business/regulation/99685.aspx>

# 4 Inert Waste

This section provides some basic details on the waste acceptance requirements for inert waste. More detailed information can be found in our technical guidance note on landfills for inert waste.<sup>18</sup>

## 4.1 Definition

The definition of inert waste in the Landfill Directive is:

"inert waste" means waste that does not undergo any significant physical, chemical or biological transformations. Inert waste will not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm human health. The total leachability and pollutant content of the waste and the ecotoxicity of the leachate must be insignificant, and in particular not endanger the quality of surface water and/or groundwater.

## 4.2 Treatment

Where technically feasible, wastes must be treated before they are deposited in a landfill.

## 4.3 Waste listed as acceptable without testing

The Council Decision includes a list of wastes in Section 2.1.1 that are assumed to be inert and therefore acceptable at a landfill for inert waste without testing, if:

- they are single stream waste of a single waste type (although different waste types from the list may be accepted together if they are from a single source); and
- there is no suspicion of contamination and they do not contain other material or substances such as metals, asbestos, plastics, chemicals, etc to an extent which increases the risk associated with the waste sufficiently to justify their disposal in other classes of landfill.

In the case of suspicion of contamination (either from visual inspection or from knowledge of the origin of the waste) the waste must be WAC tested (or refused acceptance at a landfill for inert waste).

**If you are unsure whether a waste fulfils the definition of inert waste, you must undertake WAC leaching tests.**

## 4.4 WAC Limit values

Waste that does not meet the above criteria can only be accepted at landfill for inert waste if it is tested to confirm:

- It is not hazardous waste; and
- It does not exceed the WAC limit values provided in the tables in Section 2.1.2.1 and 2.1.2.2 of the Council Decision. These relate to leaching and to total organic content parameters respectively.

For details of test methods, including percolation tests, refer to the Council Decision and to our own detailed guidance on sampling and testing<sup>19</sup>.

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<sup>18</sup> Environment Agency, 2009, *Environmental Permitting Regulations: Inert Waste Guidance, Standards and Measures for the Deposit of Inert Waste on Land*. <http://publications.environment-agency.gov.uk/pdf/GEHO0509BPWJ-e-e.pdf>

<sup>19</sup> , Environment Agency 2005, *Guidance on sampling and testing of wastes to meet landfill waste acceptance procedures*. [http://www.environment-agency.gov.uk/static/documents/Business/sampling\\_and\\_testing\\_1069398.pdf](http://www.environment-agency.gov.uk/static/documents/Business/sampling_and_testing_1069398.pdf)

## 4.5 TOC derogation

The Council Decision, in the introduction to Section 2 of the Annex, contains a potential derogation to allow soils up to two times the TOC limits to be deposited at landfills for inert waste in certain circumstances.

Landfill operators wishing to pursue this approach will need to apply to vary their permit. The application must be waste-specific and must specify what limit of TOC is being applied for. It must include a risk assessment considering whether the landfill is designed such that it can cope with any gas and/or leachate that may be produced as a result of accepting this waste.

The producer will need to make a case for an increased TOC up to 2 x the WAC limit.

This derogation is limited to specified wastes (soils) and if the Environment Agency approves the derogation it will give a permit for the specified wastes on a case-by-case basis for the recipient landfill, taking into account the characteristics of the landfill and its surroundings.

We must report all instances where landfill permits authorise this to the European Commission.

Section 6 provides more detail on acceptance of hazardous waste at landfill.

# 5 Non-hazardous waste

## 5.1 Landfill for non-hazardous waste

A landfill site for non-hazardous waste can accept municipal waste along with non-hazardous wastes (including inert wastes) of any other origin.

There are no numerical WAC limits for landfills for non-hazardous waste. This means there is no limit on the organic content of an individual waste stream accepted at a landfill for non-hazardous waste. However there are high-level biodegradable waste diversion targets laid out in Article 5 of the Landfill Directive.

The key requirement is to ensure the waste is not hazardous. See Section 2 (including Figures 1 and 2) and below.

The List of Wastes Regulations implement the European Waste Catalogue and you should use these Regulations as a starting point in the determination of whether a waste is hazardous. They contain three types of entry, two of which are relevant to this section:

- **Mirror entries.** These wastes may be hazardous or non-hazardous, according to the concentration of dangerous substances in them. Compositional testing will be required to check the waste is non-hazardous (an assessment of the solid components of the waste).
- **Absolute non-hazardous entries.** These wastes are deemed to be non-hazardous. No compositional testing or WAC testing is required.

This means that in certain cases no testing (compositional testing or WAC testing) of the non-hazardous waste needs to be carried out prior to disposal in a landfill for non-hazardous waste.

There may however be site-specific reasons why you need to undertake WAC testing on your waste. This would be specified in the landfill permit (for example, if the waste is suspected of containing high levels of leachable parameters which must be assessed in the risk assessment).

## 5.2 Separate cell for stable non-reactive hazardous waste

There are WAC limits for non-hazardous waste which is landfilled in the same cell as stable non-reactive hazardous waste (SNRHW). This is discussed in Section 7.1.

# 6 Hazardous Waste

## 6.1 Definition

Landfills for hazardous waste can only accept hazardous waste (and a small quantity of inert waste for use as cover).

As explained in Section 2, the criteria that make a waste hazardous and the WAC limits are different and may involve different parameters and different tests. They have been established for different purposes and must not be confused. Use our WM2 guidance to first establish whether or not a waste is hazardous. If the waste is hazardous, you will need to assess it against the Waste Acceptance Criteria before it can be disposed of at a landfill for hazardous waste.

This will involve completing the basic characterisation of the waste, which includes testing the waste and comparing to the limit values ('WAC limits') given in the Council Decision. As an example, a waste could be hazardous because it contains an organic carcinogen but it might be unacceptable at a landfill for hazardous waste because it contains too much leachable DOC (dissolved organic carbon).

## 6.2 Waste acceptance criteria

### 6.2.1 Granular Wastes

In order to be accepted at a landfill for hazardous waste, granular wastes must not exceed the limit values provided in Sections 2.4.1 and 2.4.2 of the Council Decision — these relate to leaching and to organic content respectively. The EP Regulations also require in Schedule 10 paragraph 8(a) that such wastes must also have either an in-situ shear strength of at least 50 kPa for cohesive waste, or an in-situ bearing ratio of at least 5% for non-cohesive waste.

Some inorganic parameters may be present in the waste which present a risk of pollution or harm but are not listed in the tables (Sections 2.4.1 and 2.4.2). For these parameters you will need to obtain a statistically significant maximum leachable value from the upflow percolation test for inorganic constituents. This can be used as the source term in the risk assessment described in Section 9.

Details of test methods, including percolation tests, are set out in the Council Decision and also in our detailed guidance on sampling and testing<sup>20</sup>.

### 6.2.2 Monolithic Wastes

The WAC requirements for monolithic waste are set out in the Council Decision and in the EP Regulations (Schedule 10.)

Monolithic wastes must not exceed the leaching limit values provided in either Section 2.4.1 of the Council Decision (granular hazardous WAC) or the tables in Schedule 10, paragraph 9(b) of the EP Regulations (leaching limit values and other parameters for monolithic wastes). Such wastes must also:

- have a mean unconfined compressive strength of at least 1 MPa after 28 days curing; and
- have either:
  - dimensions of greater than 40 cm along each side, or
  - a depth and fracture spacing when hardened of greater than 40 cm.

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<sup>20</sup> Environment Agency 2005, *Guidance on sampling and testing of wastes to meet landfill waste acceptance procedures*. [http://www.environment-agency.gov.uk/static/documents/Business/sampling\\_and\\_testing\\_1069398.pdf](http://www.environment-agency.gov.uk/static/documents/Business/sampling_and_testing_1069398.pdf)

Granular waste can be treated to make it monolithic. The waste can only be accepted at a landfill if, before the monolithic stage of the treatment process, the waste met a limit value for:

- loss on ignition (LOI) of 10%; or
- total organic carbon (TOC) of 6%.

It is important to limit the organic value in the wastes that are to be solidified. Experience has shown that waste solidification may be hampered by high organic content. The monolithic limit values are also required to provide the same level of environmental protection as those given for the corresponding granular wastes set within the Landfill Directive.

### 6.3 Higher Landfill WAC Limit Values

The Environment Agency and Defra issued a joint statement on 23<sup>rd</sup> July 2008<sup>21</sup> explaining their policy position on the use of higher landfill waste acceptance criteria limit values. We issued a regulatory position statement in June 2008<sup>22</sup> explaining the updated position on TOC derogations. This stated that the previously accepted derogation on organic limits was no longer available. Since then, Defra's Hazardous Waste Strategy has been issued<sup>23</sup>. Principle 6 of that strategy states that reliance on the '3xWAC' (inorganic content) derogations must end. It also states that this will be a phased process to coincide with development of alternative treatment.

Although the Hazardous Waste Strategy does not apply in Wales, there are no landfill sites in Wales with the 3xWAC derogation.

#### 6.3.1 Leaching Limit Values (inorganic content)

The Council Decision allows a derogation for up to three times the WAC limits for specific parameters. In line with the overall aim of the Landfill Directive to reduce our reliance on landfill and the Hazardous Waste Strategy, in particular Principle 6, **we will not accept** any more applications to vary permits to allow up to three times the WAC leaching limit values.

There are currently seven permits with '3xWAC' derogations. We will be developing a strategy to vary these permits to phase out the derogations over time.

Any waste that cannot achieve WAC leaching limits could now be a problematic waste. Our position on problematic waste streams is set out in Section 6.4 and on our web-site.

#### 6.3.2 Limits on organic content

The organic content in a hazardous waste stream can be the result of a separate component (for example paper or plastic) or might be the reason for the waste being "hazardous waste" (for example PCBs or PAHs).

Historically, different EU member states have used different measures to control organic content of waste going to landfill and the Landfill Directive sets out three parameters that can be used to limit the organic content of hazardous waste. Each of these has an associated limit. The 3 parameters are Dissolved Organic Carbon (DOC), Total Organic Carbon (TOC) and Loss on Ignition (LOI).

Although the Council Decision contains a potential derogation from the limit on TOC content, in line with the overall aim of the Landfill Directive to reduce our reliance on landfill, we expect hazardous waste to meet the 6%TOC limit set out in the Council Decision (or the 10% LOI limit).

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<sup>21</sup> Defra/Environment Agency, July 2008, approach to the use of higher Waste Acceptance Criteria (WAC) limits for hazardous waste, <http://www.defra.gov.uk/environment/waste/topics/documents/wac080723.pdf>

<sup>22</sup> Environment Agency Regulatory Position Statement, June 2008, [http://www.environment-agency.gov.uk/static/documents/Business/haz\\_position\\_final\\_2064308.pdf](http://www.environment-agency.gov.uk/static/documents/Business/haz_position_final_2064308.pdf)

<sup>23</sup> Department for Environment, Food and Rural Affairs, March 2010, *A Strategy for Hazardous Waste Management in England*

## 6.4 Problematic waste streams

A problematic waste stream is a waste that cannot meet the Waste Acceptance Criteria and for which there is genuinely no current alternative other than continued landfilling. We have set out our position on these wastes in full on our web-site, where you will also find information on options for wastes that we have already considered. If you have identified such a waste stream then you should contact your local Environment Agency officer for further advice on how to proceed.

## 6.5 Landfill cover and engineering materials

Suitable inert wastes may be used in landfills for redevelopment or restoration and filling-in work, or for construction purposes. Inert waste may be used for daily cover and for engineering purposes.

# 7 Special provisions

An important option for those wanting to send hazardous wastes to landfill is to dispose of stable, non-reactive hazardous wastes (SNRHW) in a landfill for non-hazardous waste. Such waste must go into a separate cell that is not used for the deposit of biodegradable wastes.

This section deals with SNRHW, and the following cases for which the Council Decision and EP Regulations set out special provisions:

- asbestos wastes
- gypsum and other high sulphate bearing wastes
- underground storage.

Guidance on the specific engineering requirements for the necessary separation of SNRHW, asbestos waste and gypsum waste from other wastes can be found in LFD1<sup>24</sup>.

## 7.1 Stable, non-reactive hazardous wastes

This option allows hazardous waste that has been stabilised and thus has a low leaching potential to be deposited in cells with a standard of containment consistent with non-hazardous wastes.

The Council Decision allows for stable non-reactive hazardous waste to be accepted into landfills for non-hazardous waste subject to specific provisions set out in Section 2.3 of the Council Decision. It defines 'stable, non-reactive hazardous waste' as:

'hazardous waste, the leaching behaviour of which will not change adversely in the long-term, under landfill design conditions or foreseeable accidents: in the waste alone (for example, by biodegradation); under the impact of long-term ambient conditions (for example, water, air, temperature or mechanical constraints); by the impact of other wastes (including waste products such as leachate and gas).'

Granular stable, non-reactive hazardous wastes must not exceed the limit values set out in Tables 2.3.1 and 2.3.2 of the Council Decision. The EP Regulations also require in Schedule 10 paragraph 8(a) that such wastes must also have either an in situ shear strength of at least 50 kPa for cohesive waste, or an in situ bearing ratio of at least 5% for non-cohesive waste.

Monolithic stable non-reactive hazardous wastes (as defined in Section 6.2.2 above) must not exceed the leaching limit values provided in either Section 2.3.1 of the Council Decision (granular hazardous WAC) or the limits given in Schedule 10, paragraph 9(a) of the EP Regulations (leaching limit values and other parameters for monolithic wastes). Such wastes must also:

- have a mean unconfined compressive strength of at least 1 MPa after 28 days curing; and
- have either:
  - dimensions of greater than 40 cm along each side, or
  - a depth and fracture spacing when hardened of greater than 40 cm.

It is important to note that non-hazardous wastes deposited in the cells with stable, non-reactive hazardous wastes must also meet the same criteria and therefore must not biodegrade.

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<sup>24</sup> Environment Agency, April 2010, *RGS No LFD1 Understanding the Landfill Directive*, version 2. [http://www.environment-agency.gov.uk/static/documents/Business/RGN\\_LFD1\\_Landfills\\_\(v2.0\)\\_30\\_March\\_2010.pdf](http://www.environment-agency.gov.uk/static/documents/Business/RGN_LFD1_Landfills_(v2.0)_30_March_2010.pdf)

## 7.2 Asbestos wastes

Asbestos cells may be permitted in either landfills for hazardous or non-hazardous wastes, provided the following procedures are followed:

- All asbestos wastes must be appropriately packaged in accordance with the approved codes of practice and guidance documents<sup>25</sup>. If the waste consists of bonded asbestos that is not packaged, it should be regularly sprinkled with water.
- Once deposited, the waste must be covered immediately to a depth of at least 250 mm. By the end of the working day at least one metre of cover should be placed on all flanks and surfaces. The objective of cover in these cells is to ensure that no asbestos or waste containing asbestos is left exposed. This should prevent the aerial dispersion of asbestos fibres from the zone of deposit. Deviation from the depth specified here may be acceptable where it can be demonstrated by the operator that the depth proposed and method of application provides an equivalent level of protection to the environment and human health.
- Final top cover must be placed on the landfill/cell in order to avoid dispersion of fibres. This must consist of at least two metres of suitable material, before placement of the restoration material. Use suitable material for all covering purposes. This must be incombustible, granular material free from any objects capable of disrupting the waste or any packaging.
- No works shall be carried out on the landfill/cell that could lead to a release of fibres (for example, drilling of holes or excavation of the waste).
- The key principle behind the use of discrete cells for asbestos is to ensure that the asbestos remains physically separate from the main body of waste in the site and isolated from the landfill gas extraction system.

The Council Decision specifies how asbestos must be managed in Section 2.3.3.

### 7.2.1 Landfills for Non-hazardous waste

The Council Decision (interpreted by the EP Regulations) states:

'Construction materials containing asbestos and other suitable materials may be landfilled at landfills for non-hazardous waste in accordance with Article 6(c)(iii) of the Landfill Directive without testing.'

This means that wastes that are only hazardous because of their asbestos content can be disposed of at landfills for non-hazardous waste in separate landfill cells that only accept asbestos wastes and other suitable materials without testing. Article 6(c)(iii) requires that stable non-reactive hazardous waste shall not be deposited with biodegradable waste and must meet the waste acceptance criteria set out in accordance with Annex II (which includes the Council Decision annex).

We expect construction waste to be managed appropriately and asbestos waste, when produced, must not be mixed with other waste streams. Therefore the requirement to only deposit asbestos and other suitable material in the cell can be met by careful segregation of waste streams at the time of production.

In considering whether a waste is suitable to be deposited in a separate asbestos cell, you should have regard to the requirements for the waste to be kept separate and comply with SNRHW WAC leaching limits (including the 5% TOC limit). You should take all possible steps to segregate asbestos from other wastes so that each waste stream can be dealt with appropriately.

If you have a waste that contains asbestos but can not meet the SNRHW WAC limits you will need to treat the waste (if possible) otherwise it may be acceptable at a landfill for hazardous waste (if it meets the WAC).

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<sup>25</sup> Health and Safety Executive, 2006, *L143 Work with materials containing asbestos*. Control of Asbestos Regulations 2006.

If you are considering accepting gypsum into an asbestos cell, all the waste in that cell must meet the leaching limits and other criteria for SNRHW (see Section 7.3.2).

### 7.2.2 Landfills for hazardous waste

Wastes that contain asbestos and that are also hazardous by virtue of other constituents can only be disposed of at a landfill for hazardous waste permitted to accept both the asbestos and the other hazards. These wastes can be disposed of within a defined area that is not necessarily a separate cell. The waste must be adequately covered using suitable materials, such as hazardous contaminated soil (subject to limits on organic matter content).

It is not necessary to apply the same separation requirements as for asbestos cells within a landfill for non-hazardous waste. It is however recommended that the area is upgradient of the leachate drain in order to reduce the contamination of the leachate with asbestos fibres. More information on asbestos cells can be found in LFD1<sup>26</sup>.

Loads containing asbestos destined for disposal in a landfill for hazardous waste must be tested as part of their basic characterisation to ensure they meet the WAC limits for hazardous waste.

#### **Asbestos containing waste which can not meet WAC**

If you have a waste containing asbestos that can not meet the HW WAC limits (for example, it has a high organic content) you must contact your local Environment Agency office to seek advice on how to dispose of it. This should only occur in rare cases, for example, an asbestos-roofed barn containing potatoes has burnt down creating a waste with a high organic content (contaminated with asbestos). Such wastes will be considered as potentially problematic waste streams. See section 6.4 and our website.

## 7.3 Gypsum and other high sulphate bearing wastes

Gypsum and other wastes with a high sulphate content are (generally) non-hazardous. However, because gypsum will react with biodegradable materials to produce hydrogen sulphide gas which is highly toxic and malodorous, the Council Decision requires them to be deposited in a separate cell away from any biodegradable wastes.

The Council Decision Annex (interpreted by the EP Regulations) states, paragraph 2.2.3:

'Non-hazardous gypsum-based and other high sulphate-bearing materials should be disposed of only in landfills for non-hazardous waste in cells where no biodegradable waste is accepted. The limit values for TOC and DOC given in sections 2.3.2 and 2.3.1 [of the Council Decision] shall apply to wastes landfilled together with gypsum-based materials.'

We consider that this means:

You can only send non-hazardous gypsum-based waste to a landfill for non-hazardous waste if it is deposited in a cell where no biodegradable waste is accepted.

This means in certain circumstances it may be possible to dispose of gypsum in an asbestos or SNRHW cell at a landfill for non-hazardous waste (see below).

Where gypsum-based and other high sulphate-bearing materials are hazardous, you must dispose of these wastes at a landfill for hazardous waste.

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<sup>26</sup> Environment Agency, April 2010, RGS No LFD1 Understanding the Landfill Directive, version 2. [http://www.environment-agency.gov.uk/static/documents/Business/RGN\\_LFD1\\_Landfills\\_\(v2.0\)\\_30\\_March\\_2010.pdf](http://www.environment-agency.gov.uk/static/documents/Business/RGN_LFD1_Landfills_(v2.0)_30_March_2010.pdf)

You must separate biodegradable waste from gypsum waste prior to landfilling. Some biodegradable materials likely to cause wastes to exceed the TOC and DOC limit values are wood, paper, card, garden waste, food waste and topsoil.

We have produced a briefing note which provides more information on the ban on landfilling gypsum and plasterboard in cells with biodegradable waste<sup>27</sup>. Landfilling is not best practice for gypsum and there are many recovery sites available (see the WRAP website: [www.wrap.org.uk/plasterboard](http://www.wrap.org.uk/plasterboard)) Waste pre-treatment, as required by the Landfill Directive, should isolate gypsum so that it can be recovered wherever possible.

### 7.3.1 Other high sulphate bearing wastes

Aside from gypsum, plaster and plasterboard, there are other wastes which also have a high level of sulphate in them. These are identified in the EP Regulations as 'other high sulphate bearing wastes'.

We will adopt a risk-based approach to the deposit of high sulphate bearing waste with biodegradable waste. If a landfill operator wishes to accept 'other high sulphate bearing wastes' with biodegradable waste, their landfill permit application must include a risk assessment to justify the acceptance of these wastes. It must also include monitoring for hydrogen sulphide production as part of the landfill gas monitoring regime (to confirm that unacceptable concentrations of hydrogen sulphide are not being emitted from the site).

We will decide at permitting stage whether these wastes can be accepted into a cell with biodegradable non-hazardous waste or must be restricted to a separate cell with no biodegradable waste.

### 7.3.2 Asbestos and Gypsum

In certain situations it may be possible to dispose of gypsum in a separate asbestos cell at a landfill for non-hazardous wastes. The key legal requirements are:

- **All wastes landfilled in the cell must meet the SNRHW WAC limits (including TOC)**
- **The asbestos requirements must be met (see Section 7.2)**

As a landfill operator you must have robust waste acceptance procedures in place to ensure no biodegradable waste (such as asbestos contaminated wood or topsoil) is accepted into the cell, including as cover.

The cell must be designed to deal with both the asbestos and the gypsum wastes as no infrastructure can be retro-fitted into the cell. In particular, you must install gas wells, as waste acceptance advances, to monitor and potentially extract any gas produced within the cell. You will need to consider what precautions you will have to take to avoid release of asbestos fibres. You will be required to submit the monitoring data on a regular basis.

If you have an existing asbestos cell and wish to apply to take gypsum wastes into that cell, you must ensure that no biodegradable wastes have been accepted into the cell.

You will need to demonstrate that the design and operation of such a cell will enable all the wastes within the cell to be managed safely.

If you are a landfill operator considering developing such a cell, you are advised to contact your Environment Agency inspector for advice on how it should be designed and operated.

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<sup>27</sup> [http://www.environment-agency.gov.uk/static/documents/Leisure/mwrp007\\_2163539.pdf](http://www.environment-agency.gov.uk/static/documents/Leisure/mwrp007_2163539.pdf)

## 7.4 Underground storage

The Landfill Directive treats underground storage in the same way as other kinds of landfill, except with regard to the waste acceptance criteria. Most other requirements of the Directive apply equally to underground storage, in particular to:

- classification and ending of co-disposal;
- acceptance only of treated wastes;
- prohibited wastes.

The Landfill Directive defines underground storage as:

‘A permanent waste storage facility in a deep geological cavity such as a salt or potassium mine.’

Appendix A of the Council Decision excludes outright the following wastes from underground storage:

- a) Wastes listed in Article 5(3) of the Landfill Directive [that is, the wastes generally banned from landfill (Section 3 of this guidance)].
- b) Wastes and their containers which might react with water or with the host rock under the storage conditions and lead to:
  - a change in the volume;
  - generation of auto-flammable or toxic or explosive substances or gases; or
  - any other reactions which could endanger the operational safety and/or the integrity of the barrier.Wastes which might react with each other must be defined and classified in groups of compatibility; the different groups of compatibility must be physically separated in the storage.
- c) Wastes that are biodegradable.
- d) Wastes that have a pungent smell.
- e) Wastes that can generate a gas-air mixture which is toxic or explosive. This particularly refers to wastes that:
  - cause toxic gas concentrations due to the partial pressures of their components;
  - form concentrations when saturated within a container, which are higher than 10% of the concentration which corresponds to the lower explosive limit.
- f) Wastes with insufficient stability to correspond to the geomechanical conditions.
- g) Wastes that are auto-flammable or liable to spontaneous combustion under the storage conditions, gaseous products, volatile wastes, wastes coming from collections in the form of unidentified mixtures;
- h) Wastes that contain, or could generate, pathogenic germs of communicable diseases (already provided for by Article 5(3)(c) of the Landfill Directive).

A site-specific risk assessment will determine which remaining wastes are acceptable.

Many of the elements of the risk assessment will be the same as for a normal landfill. The key differences are:

- There is greater emphasis on understanding the geomechanical behaviour of the cavity.
- Most underground stores will be much deeper than a quarry, and you need to understand the deep geology and hydrogeology.
- The period covered by the assessment is likely to be longer than for a landfill - in most cases it will extend into geological time.

The Council Decision sets out the waste acceptance criteria for inert wastes (Section 2.1) and non-hazardous wastes (Section 2.2). The waste acceptance criteria in Section 2.4 of the Council Decision do not apply at underground storage sites for hazardous wastes: the risk assessment determines which wastes are acceptable (outside the exclusions referred to above).

# 8 Waste acceptance procedures and criteria

## 8.1 Introduction

The Landfill Directive and Council Decision introduce a hierarchy of waste characterisation and testing known as the waste acceptance procedures:

- Level 1 – basic characterisation
- Level 2 – compliance testing
- Level 3 – on-site verification.

Level 1: Basic characterisation. This is a thorough determination, according to standardised analysis and behaviour-testing methods, of the short and long-term leaching behaviour and/or characteristic properties of the waste.

Level 2: Compliance testing. This is periodic testing of regularly arising wastes by simpler standardised analysis and behaviour-testing methods to determine whether a waste complies with permit conditions and whether a waste with known properties has changed significantly. The tests focus on key variables and behaviour identified by basic characterisation.

Level 3: On-site verification. This constitutes rapid check methods to confirm that a waste is the same as that which has been subjected to compliance testing and that which is described in the accompanying documents. It may merely consist of a visual inspection of a load of waste before and after unloading at the landfill site

**This means that before sending waste to landfill, waste producers and landfill operators must ensure that they know:**

- **all of the properties of the waste which are relevant to its potential for pollution or harm to health (this includes a hazardous waste assessment using WM2); and**
- **the options for the management of the waste.**

Regularly arising wastes must then be periodically checked to ensure that those properties have not changed.

All wastes must also be checked at the landfill in order to verify that it is the expected waste and that it has not been contaminated in storage or transport.

## 8.2 Responsibilities

The waste producer is best placed to determine the basic characteristics of the waste. The waste producer may be:

- an original producer — anyone whose activities produce waste; or
- a secondary producer — anyone who carries out pre-processing, mixing or other operations which change the nature or composition of this waste.

The person who sends the waste to landfill is usually a secondary producer because waste must be treated prior to landfill. The secondary producer normally needs information from the original producer in order to decide upon the treatment required. Many of the principles of basic characterisation will help original producers to decide on the best overall management of waste, whether by landfill or otherwise, and to comply with the Duty of Care.

We expect that, in most cases, the information from Level 1 basic characterisation will be provided by the waste producer.

It is the landfill operator who must decide what parameters should be compliance tested (Level 2), using the results of the basic characterisation (Level 1). The landfill operator is responsible for ensuring that only waste acceptable at his site is taken and he must be prepared to refuse to accept waste that he is not certain about. Therefore he should carry out the compliance testing, documenting and justifying the selection of parameters.

## 8.3 Basic characterisation (Level 1)

### 8.3.1 Generic information needs

The Council Decision Annex (interpreted by EP Regulations) specifies what information is required in paragraph 1.1. Basic characterisation has 4 key functions:

- a) Information on the waste (type and origin, composition, consistency, leachability and – where necessary and available – other characteristic properties)
- b) Information to help understand the behaviour of waste in landfills and options for pre-treatment
- c) To assess the waste against limit values
- d) Detect key variables (critical parameters) for compliance testing.

The List of Waste Regulations 2005 brings the European Waste Catalogue into force in England and Wales. You must use the List of Waste Regulations to identify waste for waste transfer notes. We have produced guidance on the List of Wastes<sup>28</sup>. Although each code is associated with a waste description, you will usually need additional information and a more precise description to determine whether the waste:

- is permitted at a specific site;
- can go to a particular class of landfill;
- meets the general principles of Annex II of the LFD.

As a general rule waste must be tested to obtain the information required for basic characterisation. **In addition to the leaching behaviour, the composition of the waste must be known or determined by testing.**

So the basic characterisation will determine the key variables in the waste. These are the properties that determine the potential for environmental impact or harm to health and may affect waste classification. These variables form the parameters to be assessed in Level 2 and Level 3 checking, and establish the frequency of those checks.

The landfill operator must check that any given waste stream complies with the waste acceptance criteria for his landfill. He must ensure and demonstrate that he is accepting only wastes that meet the conditions of his permit. The landfill operator will need to be confident that the waste producer has characterised the waste accurately. In particular, the landfill operator will need to ensure that the production process has no significant 'hot-spots' — abnormal or unusual runs/batches/episodes. These might generate wastes which would fail the site acceptance criteria.

The landfill operator must therefore have access to all relevant findings from the producer's basic characterisation programme. This is not an explicit requirement of the legislation (although the Duty of Care is relevant). However it is cost-effective for both the waste producer and the landfill operator to view the data collection as a partnership and share the information.

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<sup>28</sup> Environment Agency. April 2006, Using the List of Wastes to code waste for Waste Transfer Notes, PPC Permits and Waste Management Licences in England & Wales- Living Guidance from the Environment Agency, Version 1.  
[http://www.environment-agency.gov.uk/static/documents/Business/low\\_guide\\_v1.2\\_1397222.pdf](http://www.environment-agency.gov.uk/static/documents/Business/low_guide_v1.2_1397222.pdf)

The landfill operator's assessment of the characterisation data will vary according to the circumstances. For example:

- A producer of a low-variability waste is an existing client. The landfill operator has accepted similar waste for some time from this client and it seems to be consistent. The producer states that L/S 10 or other data is available to demonstrate that the waste is consistent, and nowhere near the limit values for waste classification or waste acceptance criteria. This is a low-risk customer, and the landfill operator is happy with the level of data provided.
- A new client approaches the operator. There is no information on the consistency of the waste, so the landfill operator may ask for evidence for any claim that the waste is consistent and to make sure that the dataset does not just relate to best case and/or unrepresentative samples. The landfill operator will concentrate on the maximum values provided, and will look for any evidence to indicate whether these relate to normal conditions or to potentially unfavourable wastes. The new client and the landfill operator must work in partnership and negotiate the contract on the basis of free transfer of data between the parties. The Level 1 dataset is 'on the table' and the waste producer and landfill operator combine efforts in sampling and testing for the compliance programme.

### 8.3.2 Types of waste arising

How often the producer has to undertake the basic characterisation depends on the type of waste. The Council Decision (in paragraph 1.1.3) distinguishes between wastes that are regularly generated in the same process and wastes that are not regularly generated.

#### 8.3.2.1 Regularly generated wastes

These are individual and consistent wastes regularly generated in the same process, where the process is well known and the inputs are well defined. They can be from different installations if they are a single stream with common characteristics within known boundaries.

The basic characterisation for these wastes should focus on:

- Compositional range of the wastes
- Range and variability of characteristic properties
- If required, leachability of the wastes
- Key variables to be tested on a regular basis

When the waste has been fully characterised it only needs to be subject to compliance testing unless there are significant changes in the generation process. The producer (installation operator) shall inform the landfill operator of any changes to the process.

#### **Wastes generated by waste treatment processes**

Normally, we do not consider that the outputs from waste treatment processes are 'regularly generated.' This is because the inputs are generally extremely variable and there is limited process control. This means the outputs will be very variable. This means every batch should be tested (see 8.3.2.2 below). If however you consider your process to produce 'regularly generated' waste you must provide evidence that this is the case.

#### 8.3.2.2 Wastes that are not regularly generated

These are not regularly generated in the same process in the same installation and are not part of a well-characterised waste stream. Each batch produced will need to be characterised. The basic characterisation must include the fundamental requirements for basic characterisation. As each batch produced has to be characterised, no compliance testing is needed.

### 8.3.3 The need for testing

Waste must be tested to obtain the information required for basic characterisation (paragraph 1.1.1(d) of the Council Decision Annex). However, it is not necessary in the following cases:

- a) The waste is on a list of wastes not requiring testing.
- b) All the necessary information for the basic characterisation is already known and justified to our satisfaction (that is, Council Decision paragraph 1.1 (a)-(k)).
- c) Certain waste types where testing is impractical or where appropriate testing procedures and acceptance criteria are unavailable. The reasons for this must be justified and documented, including why the waste is deemed acceptable at the landfill class.

#### **a) Listed wastes**

The Council Decision specifies certain wastes which you do not have to test:

- Paragraph 2.1.1 – Listed Inert Wastes – see Section 4.0 of this guidance
- Paragraph 2.2.1 – Municipal waste that is classified as non-hazardous in Chapter 20 of the List of Waste Regulations 2005, and separately collected fractions of household wastes and the same non-hazardous materials from other origins. These wastes must have been subject to prior treatment.

You will still need to test the waste as part of its basic characterisation where there is a possibility that the waste has been contaminated during previous use, production, storage or transport. For example, a soil may have been contaminated by a use of the land, or a clean soil may have been mixed with contaminated soil during transfer.

#### **b) Information already available**

This case will usually only apply to wastes that are regularly generated in the same process in the same installation. These will have been previously tested, or otherwise investigated, so that the data already exists - the producer or previous operators may have tested the waste. If so, it is not then necessary for each new receiving landfill operator to check the basic characterisation, provided that he has access to the earlier information. The producer and the process generating the waste must be well known, and the input materials to the process and the process itself must be well defined. Regular compliance testing must confirm the continuing consistency of composition. Wastes from facilities for the bulking of waste, from waste transfer stations, or from some treatments, will not fall into this category.

#### **c) Testing impractical**

There may be a few wastes for which testing is impractical. We believe this situation should be extremely unusual. It is still necessary to have sufficient information about the waste to be confident that it meets the relevant criteria for the class of landfill and any site-specific requirements. Where a landfill accepts a waste under this clause, the circumstances and justification should be documented in writing.

## 8.4 Compliance (Level 2)

### 8.4.1 Introduction

The Directive (Annex 2, point 3) describes compliance testing as:

periodical testing by simpler standardised analysis and behaviour-testing methods to determine whether a waste complies with permit conditions and/or specific reference criteria. The tests focus on key variables and behaviour identified by basic characterisation.

The Council Decision Annex, paragraph 1.2 provides more detail. In accordance with the EP Regulations, records must be kept for 2 years.

As explained in 8.3.2, compliance testing is only relevant to regularly generated wastes. Each batch of waste 'not regularly generated' (for example, one-off wastes, outputs from waste treatment processes) will need full Level 1 basic characterisation (including testing if necessary).

## 8.5 On-site verification (Level 3)

There are three levels of on-site verification advocated by the Council Decision Annex, paragraph 1.3:

- documentation check
- visual inspection
- periodic sampling

**Check the required documentation.** The waste may then be accepted at the landfill, if it is the same as that which has been shown to be acceptable by basic characterisation and compliance testing and is the waste described in the accompanying documents. If this is not the case, the waste should not be accepted. For wastes deposited by the waste producer at a landfill under his control, the verification may be made at the point of dispatch.

**The operator must visually inspect every load of waste delivered to a landfill.** If practicable, you should do this before as well as after unloading. For example, when a load is uncovered, it may be immediately apparent that unacceptable materials are present. Rejecting the load at this stage avoids the need to remove the waste after deposit. You cannot inspect some types of container before deposit. However, there may sometimes be grounds for suspicion — for example a smell of solvents associated with a load of inert waste — that would dictate either refusal or a more careful inspection of the load.

**The Council Decision suggests that waste should be sampled periodically.** The Landfill Directive (and our landfill permit conditions) requires that these samples are kept for at least 1 month.

## 8.6 The effect of Article 5(4)

Related to the WAC is Article 5(4) of the Landfill Directive which states:

'The dilution or mixture of waste solely in order to meet the waste acceptance criteria is prohibited.'

We interpret this to mean;

Simple physical dilution, without any concurrent chemical or physico-chemical changes, is not an acceptable treatment process. For example, it is not acceptable to deliberately dilute contaminated soil with other soils or minerals in order to bring the concentrations of toxic components below those for hazardous waste.

It is acceptable to mix wastes, or wastes with other materials, in order to achieve a chemical or physico-chemical change where the treatment is permitted. For example, mixing acids and alkalis to adjust pH is an acceptable treatment — provided that it does not result in a waste which is prohibited because, for example, it is liquid or corrosive. The use of alkaline materials such as lime to reduce the mobility of heavy metals is acceptable; the use of those materials simply to dilute the heavy metals is not. However this does not preclude judgements on the hazardousness or whether the treatment constitutes 'best available techniques.'

## 8.7 Test methods and sampling

The test methods are specified in the Council Decision Section 3, and are described in our detailed guidance on sampling and testing<sup>29</sup>. Our detailed guidance also discusses waste sampling, by reference to the British Standard on sampling (this is the UK implementation of the European standard)<sup>30</sup>.

WAC testing (and also compositional testing) should be done on the 'as-landfilled' waste: that is, the waste that has undergone the necessary pre-treatment. The test methods will require the waste sample to be processed (sometimes including drying) before analysis but the specified test method will detail what processing the laboratory is required to do and how they should report the results.

The British standard for the WAC leaching tests<sup>31</sup> includes single and two-part leaching tests. The legislation states that a leach test must give a liquid to solid ratio value of 10 (L/S 10).

Our sampling and testing guidance requires the use of the two-part test for Level 1 basic characterisation (L/S 2 + L/S 8) 'because it provides more information about the leaching behaviour of the waste over time'. For Level 2 compliance testing our Regulatory Position<sup>32</sup> states that we do not consider there to be an environmental benefit in requiring the two-part test for ongoing Level 2 compliance testing by landfill operators.

It is not possible to provide detailed technical guidance for every conceivable sampling situation, so the emphasis in the British Standard is on the development of a sampling plan. The sampling plan details everything from the sampling objectives through to the toolbox of appropriate sampling methods for the type of waste and specific situation. The plan translates and documents the primary objectives of the testing programme into practical technical goals. These goals take account of the physical state, accessibility and size of the material to be sampled. The standard also has other parts addressing: the type, number and locations for sampling; sampling techniques; sub-sampling in the field; and sample packaging, preservation, storage, transport and delivery.

According to the standard, key step 1 in a testing programme is to draw up a sampling plan. Table 8.1 shows the key elements of a sampling plan according to the standard. This table is based on Figure 2 in the standard (BS EN 14899:2005).

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<sup>29</sup> Environment Agency, 2005, *Guidance on sampling and testing of wastes to meet landfill waste acceptance procedures*. [http://www.environment-agency.gov.uk/static/documents/Business/sampling\\_and\\_testing\\_1069398.pdf](http://www.environment-agency.gov.uk/static/documents/Business/sampling_and_testing_1069398.pdf)

<sup>30</sup> BS EN 14899:2005 *Characterisation of waste – Sampling of waste materials - Framework for preparation of a sampling plan*. BSI 2006.

<sup>31</sup> BS EN 12457 parts 1-4:2002 '*Leaching – compliance test for leaching granular materials and sludges*'

<sup>32</sup> Environment Agency, March 2009, Regulatory Position, *Waste testing – advice for Waste Producers and Landfill Operators*, version 1. [http://www.environment-agency.gov.uk/static/documents/Leisure/BN\\_Waste\\_leach\\_testing\\_March\\_09.pdf](http://www.environment-agency.gov.uk/static/documents/Leisure/BN_Waste_leach_testing_March_09.pdf)

Table 8.1 Key elements of a sampling plan

<b>Element</b>	<b>Consider</b>	<b>Section of the standard that provides more details</b>
Identify involved parties		4.2.1 and TR5*
Identify objectives and define technical goals	Consultation with stakeholders	4.2.2 and TR5*
Determine generic level of testing required	basic characterisation compliance testing on-site verification	4.2.3 and TR5*
Identify constituents to be tested	target parameters physical chemical biological	4.2.4 and TR5*
Research background information on waste	location of waste arising production process variability of process waste characteristics	4.2.5 and TR5*
Identify health and safety precautions		4.2.6 and TR5*
Select sampling approach Identify type of sampling: probabilistic versus judgemental	identify sampling population no of samples sampling pattern, location sample size required reliability of outcome See TR1*	4.2.7 and TR5*
Identify most appropriate sampling technique to address sampling requirements	See TR2*	4.2.8

\*The standard is supported by a number of technical reports, including: .

CEN/TR 15310-1: Characterization of waste — Sampling of waste materials — Part 1: Guidance on selection and application of criteria for sampling under various conditions;

CEN/TR 15310-2: Characterization of waste — Sampling of waste materials — Part 2: Guidance on sampling techniques;

CEN/TR 15310-3: Characterization of waste — Sampling of waste materials — Part 3: Guidance on procedures for sub-sampling in the field;

CEN/TR 15310-4: Characterization of waste — Sampling of waste materials — Part 4: Guidance on procedures for sample packaging, storage, preservation, transport and delivery;

CEN/TR 15310-5: Characterization of waste — Sampling of waste materials — Part 5: Guidance on the process of defining the sampling plan.

# 9 Site-specific risk assessment

## 9.1 Background

Assessing the risks for a specific site is fundamental to the development, operation and regulation of landfills. We have produced guidance<sup>33</sup> and templates for the risk assessments that you must submit as part of your application for a landfill permit.

The assessment of risk, particularly of hydrogeological risk, is relevant to the acceptance of waste in landfill. The risk assessment may make it necessary to set additional limits on waste acceptance for a particular site.

For further information on risk assessment at landfills for inert waste, see our Inert Waste Guidance.<sup>34</sup>

In relation to waste acceptance, you may need to consider more than just the WAC limits in the Council Decision when you are assessing risk at a landfill for hazardous or non-hazardous waste. This is because:

- a) The environmental context of the landfill may be more sensitive than that used for modelling the waste acceptance criteria.
- b) The lining and leachate collection systems perform differently from those used for modelling the waste acceptance criteria.
- c) The waste may have attributes not covered by the waste acceptance criteria. These may have the potential for pollution or harm and therefore require separate modelling and control.
- d) At landfills for non-hazardous waste, additional controls may be necessary if the waste mix could produce a leachate that is different from the typical range used for the risk assessment modelling (for example, Landsim model).

Items a) and b) will be covered by the normal hydrogeological modelling required for the permit application. For details on items c) and d) refer to Sections 9.2 and 9.3 respectively.

The normal hydrogeological modelling may show that stricter limit values are required for substances on the 'hazardous substances list' of the EP Regulations (Schedule 22). Notably such substances include mercury and cadmium.

We are responsible for enforcing the Groundwater Directive which requires that:

- We will not authorise a potentially polluting activity (for example, landfilling) that might lead to 'hazardous substances' entering groundwater.
- An investigation must be carried out before we authorise a potentially polluting activity that might lead to 'non-hazardous pollutants' causing pollution of groundwater.

The modelling used to develop the Council Decision waste acceptance criteria limit values for cadmium and mercury (see Section 11) suggested that stricter limit values are required to protect the groundwater directly beneath the landfill. We therefore expect that similar modelling for a specific permit application will come to the same conclusion and so waste producers and landfill operators should pay particular attention to the results of the leaching tests for mercury and cadmium.

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<sup>33</sup> Environment Agency, 2010, *H1 Environmental risk assessment for permits – Overview*. See <http://www.environment-agency.gov.uk/business/topics/permitting/36414.aspx>

<sup>34</sup> Environment Agency, 2009, *Environmental Permitting Regulations: Inert Waste Guidance, Standards and Measures for the Deposit of Inert Waste on Land*. <http://publications.environment-agency.gov.uk/pdf/GEHO0509BPWJ-e-e.pdf>

## 9.2 Additional parameters

Wastes may contain species outside the list of parameters that have limit values set out in the Council Decision, and those species may have the potential for pollution or harm. Generally, you can be aware of the presence of such species from:

- a knowledge of process inputs, coupled with the overall context of legislation, for example on Chemicals (Hazard Information and Packaging for Supply) (CHiP) Regulations, Control of Substances Hazardous to Health (COSHH) Regulations, general Health and Safety, and the Duty of Care;
- historical test results for total composition;
- basic characterisation.

If you suspect that other species may have the potential for pollution or harm, you should carry out statistically significant leaching tests and use the maximum value in the leachate source term for the risk assessment.

## 9.3 Landfills for non-hazardous waste

At landfills for non-hazardous waste, you may need to give extra attention to two aspects of the hydrogeological risk assessment:

- The leachate source term used in the risk assessment must be appropriate for the waste mix
- You may need to restrict the waste inputs to the landfill so that the risk assessment remains valid

### 9.3.1 Leachate source term

The requirement to treat waste prior to landfill, diversion targets for biodegradable waste and future landfill restrictions, are expected to result in the landfilling of a higher relative proportion of inorganic waste. These will produce a leachate unlike that of the Landsim default — unless the waste is landfilled with biodegradable waste. Similar considerations will apply to any landfill that accepts mainly inorganic wastes.

When applying for a permit to dispose of waste by landfill, you need to demonstrate that the source term used in the risk assessment is appropriate for the waste mix. You can do this either by reference to data from landfills which take a similar waste mix, by leach testing<sup>35</sup> of the wastes, or both. We have published research into leachate quality at landfills elsewhere in Europe in order to provide more information on which source term parameters<sup>36</sup> should be used. Defra have also recently published the results of a project in which a database of waste characterisation and landfilled waste/leachate data was developed and added to the LeachXS system. LeachXS<sup>®</sup> is a system for managing and modelling waste characterisation data<sup>37</sup>.

### 9.3.2 Control of waste mix

You need to ensure either that the waste mix stays in line with the risk assessment, or that you revise the risk assessment if the waste mix changes. This should form part of the ongoing annual monitoring and review of the conceptual model of the landfill.

Control of the waste mix may simply mean that you only accept a particular type of waste — such as a treatment residue or contaminated soil with well-understood characteristics — which fit the leaching data used in the risk assessment.

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<sup>35</sup> Environment Agency, 2005, *Guidance on sampling and testing of wastes to meet landfill waste acceptance procedures*. [http://www.environment-agency.gov.uk/static/documents/Business/sampling\\_and\\_testing\\_1069398.pdf](http://www.environment-agency.gov.uk/static/documents/Business/sampling_and_testing_1069398.pdf)

<sup>36</sup> Environment Agency, 2004, *Improved definition of leachate source term for landfills. Phase 1: Review of data from European landfills, P1-494/SR1*. <http://publications.environment-agency.gov.uk/pdf/SCHO0904BIGD-e-e.pdf>

<sup>37</sup> <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=14663&FromSearch=Y&Publisher=1&SearchText=wr0108&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>

Sometimes a source term for mixed biodegradable wastes has been used in a permit application, but there is a large amount of other non-hazardous waste to be accepted. In these cases it may be necessary to apply waste acceptance ratios. We used waste acceptance ratios in waste management licences for many years as a way of controlling the waste mix.

Waste acceptance ratios are still applicable to some parameters in non-hazardous wastes. These include: heavy metals, cyanides and phenols.

If you are making an application for a landfill site you should consider whether waste acceptance ratio controls are necessary. You should base this decision on your proposed waste mix (as used in the risk assessment).

### 9.3.3 Permitting aspects

It is for the applicant to demonstrate that the risk assessment is appropriate for the proposed waste mix. In order to ensure compliance with the Groundwater Directive, new permits require a review of the Hydrogeological Risk Assessment (HRA) every 6 years which includes an assessment of leaching data.

Problems may arise with speculative developments: the applicant may not be sure what wastes the site may attract in the marketplace. The applicant will have to base the risk assessment on assumptions, and may well use the Landsim defaults. The permit at such a site may either apply waste acceptance ratios appropriate to the risk assessment source term or require the risk assessment to be reviewed once there is better information about the waste types actually being accepted — this is the normal response to a changing waste mix.

We will discuss which option is appropriate with the applicant on a site-specific basis.

# 10 Waste management options

This guidance provides advice on specific aspects of waste acceptance. Figure 1 in Section 2 shows schematically the process of compliance with the waste acceptance requirements.

However, when you are making decisions about compliance, please consider the wider issues about the management of the waste. These should include, in particular:

- The choice of landfill as a waste management option within the framework of European and Government policy.
- Practical issues such as the cost and availability of both treatment and landfill options.
- Best practice for a particular waste stream, in particular, healthcare and related wastes.

## 10.1 European and Government policy

The waste producer is in the best position to consider how to manage waste in terms of its environmental impact. The options could be to reduce the waste produced, to re-use it, to recover it or lastly dispose of it. This is the waste hierarchy, and Government policy is to move waste management up the hierarchy, away from disposal towards reuse and reduction. Determining the characteristics of the waste will assist in the review of management options.

If the waste comes from an installation regulated under the IPPC Directive (that is, it is an installation under the EP Regulations), this process is a legal requirement. The waste producer must operate the installation in a way that avoids the production of waste. The producer has to find a use for waste that is produced unless this is technically and economically impossible.

## 10.2 Practical considerations

For landfills, practical considerations relate to cost and availability. There are many more landfills for non-hazardous waste than landfills for hazardous waste, but there are a number of separate cells at landfills for non-hazardous waste which are permitted to accept stable, non-reactive hazardous waste (SNRHW), asbestos or gypsum wastes.

Some treatments may remove the need for landfill altogether. They may result in some waste that can be recovered and a liquid for sewer discharge. If you still need to use a landfill, it may be that treatment changes the class of landfill required. For example, treatment may make a hazardous waste into a non-hazardous one, or may make a hazardous waste stable and non-reactive.

Other treatments may not change the class of landfill. For example, a treatment may reduce the quantity of hazardous waste.

In relation to treatment, practical considerations will include:

- cost
- availability
- reliability
- sensitivity to waste composition changes
- technical difficulty.

The decision must take account of the overall consideration of both treatment and landfill.

Examples of these considerations are shown in Table 10.1 overleaf.

**Table 10.1: Examples of considerations influencing decisions about waste management options**

What information is available to allow consideration of waste management options, including treatment/landfill?	Waste source Production process, process inputs etc Waste appearance Test data on composition and leaching
What are the objectives of the treatment?	Wider policy considerations, for example, move up the waste hierarchy? Comply with the treatment requirement? Remove the prohibited property of a prohibited waste? Change class of landfill? Pass leaching test? Pass other criteria, for example, total organic carbon (TOC)?
What options might be available?	<ul style="list-style-type: none"> <li>• Eliminate</li> <li>• Reduce</li> <li>• Re-use</li> <li>• Recycle</li> <li>• Physical</li> <li>• Thermal</li> <li>• Chemical</li> <li>• Biological</li> </ul>
What outcomes might occur?	Treatment not feasible (for inert wastes) Treatment does not contribute to the objectives of Directive (for other wastes) Treatment leaves no residue for landfill Treatment produces a banned hazardous waste Treatment produces hazardous waste which fails acceptance criteria Treatment produces waste acceptable in hazardous landfill Treatment produces SNRHW Treatment produces non-hazardous waste Treatment produces inert waste
Is more information needed to inform the decision?	Information on waste sufficient? Testing needed? Treatment trials required? Treatment cost and availability? Landfill cost and availability?

### 10.3 Healthcare and related wastes from the municipal and pharmaceutical sectors

The Department of Health has published the Safe Management of Healthcare Wastes (HTM 07 01)<sup>38</sup>. This provides detailed technical guidance on clinical waste segregation to meet the legislative requirements for carriage of dangerous goods and hazardous wastes, and subsequent treatment and disposal options. Segregation and treatment procedures which fall outside or short of the HTM 07 01 requirements are not acceptable. Please note that the HTM 07 01 guidance is under revision.

The HTM 07 01 guidance indicates that only non-infectious (and non-clinical) offensive-hygiene wastes, for example, 18 01 04, 18 02 03 and 20 01 99, are potentially suitable to be sent to landfill. As the 18 01 04 and 18 02 03 codes may potentially include banned wastes (for example, liquids and

<sup>38</sup> Department of Health, 2006, *Safe Management of Healthcare waste*. Health Technical Memorandum HTM 07 01.

or gypsum materials) it is important that the presence or absence of these materials is confirmed with the original producer prior to accepting the waste.

### 10.3.1 Pharmaceutical wastes

These warrant particular consideration due to their chemical complexity:

These include hazardous and non-hazardous pharmaceuticals from healthcare, municipal or pharmaceutical industry sources classified under any code including, for example, 18 01 08\*, 18 01 09, 18 02 07\*, 18 02 08, 20 01 31\*, 20 01 32, 07 05 xx, and 16 03 xx (where 'xx' denotes any code in that subchapter). This would include pharmaceutically active raw materials from manufacture.

The Safe Management of Healthcare Waste (HTM 07 01) indicates that this waste requires incineration as a clinical waste. Landfill is not an appropriate disposal option. The World Health Organisation guidance supports this conclusion. Neither considers physical/chemical treatment to be appropriate.

EPR 5.07<sup>39</sup> provides the criteria that any non-incineration treatment must meet, to process pharmaceutical and pharmaceutically contaminated wastes and render it safe for landfill, in sections 2.1, 2.3 and Annex. Landfill operators must ensure that any treated wastes they receive from these processes have been treated in accordance with these criteria.

We can include the waste codes 07 05 xx and 16 03 xx in landfill permits. They will only be permitted where a condition is included stating they are 'excluding waste medicinal products and pharmaceutically active waste materials arising from their manufacture'.

### 10.3.2 Sharps

Sharps can be broadly divided into three types:

- Cytotoxic and cytostatic contaminated (typically 18 01 08\* and 18 01 03\* or 18 02 07\* and 18 02 02\*)
- Other medicinally contaminated (including those that are fully discharged) (typically 18 01 03\* and 18 01 09, or 18 02 02\* and 18 02 08)
- Not medicinally contaminated (typically 18 01 03\* or 18 02 02\*)

Note sharps boxes often contain other pharmaceutical wastes (bottles, vials, ampoules)

To render sharps waste suitable for landfill the following criteria from EPR 5.07 must be met:

- Pharmaceuticals and pharmaceutical contamination in sharps should be destroyed by incineration. However a treatment plant that has successfully met the requirements of EPR 5.07 may also be appropriate (this criterion does not apply to non-medicinally contaminated sharps).
- The waste must be rendered unrecognisable and incapable of reuse.
- The waste must be disinfected to a minimum of STAATT level III<sup>40</sup> (either by clinical waste incineration or treatment in a treatment process that has been validated to meet this criterion).

A note on coding:

- The codes 18 01 01 and 18 02 01 apply only to sharps that are not clinical waste, and are not infectious for carriage. Their use should be considered suspect if associated with a sharps box. They should not be landfilled.
- The code 20 01 99 may be associated with clinical waste sharps from non-healthcare activities (for example body art and piercing). These should meet the same criteria as non-medicinally contaminated sharps unless such contamination has been identified.

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<sup>39</sup> Environment Agency, July 2010, *How to comply with your environmental permit - Additional guidance for: Clinical waste (EPR 5.07)*. See <http://www.environment-agency.gov.uk/business/sectors/39737.aspx>

<sup>40</sup> State and Territorial Association on Alternative Treatment Technologies level III criteria

### 10.3.3 Anatomical waste and carcasses

- Human tissue from healthcare must not be landfilled. This material must be managed in accordance with the Safe Management of Healthcare Waste (HTM 07 01) and guidance from the Human Tissue Authority. Clinical waste incineration is likely to be the sole disposal option.
- The disposal of animal carcasses is likely to be subject to Animal by-product controls.

### 10.3.4 Other Clinical Wastes

- These wastes are either incinerated or subjected to treatment processes that are designed to reduce the number of micro-organisms present in the waste.
- Non-incineration treatments should inactivate the microbes in the waste by low-temperature thermal or chemical techniques to achieve the STAATT level III criteria (for a worst case scenario challenge load). The worst case scenario challenge load ensures that all components of the waste have been treated to the required minimum standard.
- The treatment process must render the waste physically safe, unrecognisable as clinical waste and unable to be reused. Typically this will be by shredding.
- Non-incineration technologies are designed to inactivate micro-organisms and are not suitable for the treatment of waste chemicals, waste pharmaceuticals, or anatomical wastes. These must be incinerated.

Note that the STAATT level III criteria must be met by all treatment processes (including the use of 'in device' or 'in bag' chemical disinfectants) to be considered to have rendered the waste non-hazardous or 'safe'.

For more information on best practice management of clinical waste refer to the sector guidance note EPR 5.07<sup>41</sup>.

## 10.4 Responsibility for compliance

Waste producers make the initial decisions about the management of their waste and will decide whether landfill is the best option. They will usually need to liaise with waste management contractors to make this decision. They may allow a contractor to make the decisions for them, but they still have a Duty of Care.

Because waste must generally be treated prior to landfill, it is usually a secondary producer who sends the waste to landfill and is responsible for basic characterisation. The secondary producer normally needs information from the original producer in order to decide upon the treatment required. Many of the principles of basic characterisation will help original producers to decide on the best overall management of waste, whether by landfill or otherwise, and to comply with the Duty of Care. However, both types of producer are likely to undertake some characterisation in order to assess the potential waste management options in the first place, before concluding perhaps that treatment and landfill are the best solution. The original producer is best placed to supply information about the original source and process producing the waste, and therefore on the components that may be present.

If the waste is to be landfilled, then waste producers should liaise with operators to inform them:

- whether the waste has been treated;
- what treatment has been or might be applied;
- of any reasons why they consider that treatment is not required.

Written information about treatment should be on a pre-treatment declaration form, with the Duty of Care transfer note or hazardous waste consignment note.

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<sup>41</sup> Environment Agency, July 2010, *How to comply with your environmental permit - Additional guidance for: Clinical waste (EPR 5.07)*. See <http://www.environment-agency.gov.uk/business/sectors/39737.aspx>

Landfill operators should liaise with waste producers to confirm:

- what treatment has, or might have been applied;
- any reason why treatment is considered unnecessary.

Landfill operators must undertake compliance checking and verify the nature of the waste on-site. They must not accept wastes that are prohibited, do not meet the waste acceptance criteria for their site, or which their permit does not authorise.

More information on pre-treatment of wastes can be found in our guidance<sup>42</sup> (will be re-issued soon as 'Treatment of waste for landfill').

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<sup>42</sup> Environment Agency, 2011, Treatment of waste for landfill – November 2011 <http://publications.environment-agency.gov.uk/pdf/GEHO1111BVDF-E-E.pdf>

# 11 The development of WAC

The framework for the development of the waste acceptance criteria (WAC) is set by Article 11 and Annex II of the Landfill Directive.

They were initially developed by a Sub-Group of the Technical Adaptation Committee provided for by the Waste Framework Directive.

In summary, the approach of the sub-group was to model the effect of a landfill scenario on groundwater. For an agreed scenario, they examined the impact of leachate on groundwater receptors in relation to landfill dimensions, infiltration and hydrogeology. From this they determined the waste quality necessary to avoid exceeding water quality parameters at the receptors.

The modelling assumed the standards for the protection of soil and water set out in Annex I of the Landfill Directive. It incorporated assumptions about the longevity of lining and capping materials and about the management of the collected leachate over the life of those layers.

The process has been described in detail in a number of papers<sup>43, 44</sup>.

**Landfills for inert waste** have a geological barrier but no liner and no cap. Leaching parameters are therefore the most restrictive for this type of landfill. The absence of a capping requirement also means that some parameters have to be restricted from the viewpoint of more direct pathways of human exposure. This is analogous to the assessment of contaminated land.

**Landfills for hazardous waste** have the most stringent lining and capping requirements, and can therefore accept wastes with a higher leaching potential. The presence of the capping layers means that other pathways were not considered.

**Landfills for non-hazardous waste** require a lower standard of lining than landfills for hazardous waste. It is therefore possible to derive leaching values from the model in the same way as for landfills for inert waste and landfills for hazardous waste. However, the European Union accepted that it was not realistic to set leaching values (and hence testing requirements) for the mixed heterogeneous wastes typically disposed of in municipal solid waste (MSW) landfills. The UK considered that the leachate and groundwater impacts from such landfills were well characterised and controlled by site-specific risk-assessment. There are therefore no leaching limit values for landfills for non-hazardous wastes. However, the Council Decision does allow Member States to set sub-categories of non-hazardous landfill and to set national limit values for them if necessary. The UK has not done so.

## **Stable non-reactive hazardous waste**

The Directive provides that non-hazardous landfills may accept:

- Stable, non-reactive hazardous wastes with leaching behaviour equivalent to those of (non hazardous wastes)

The thickness of the mineral layer (geological barrier) is the main difference between landfills for hazardous and non-hazardous waste. The sub-group therefore derived values in the same way as for inert and hazardous waste. The sub-group felt that 'stable, non-reactive' meant that the ability to meet those leaching limit values should not change with time. Such wastes are already precluded from being deposited with biodegradable wastes. The sub-group set values for the parameters most likely to affect leaching: dissolved organic carbon (DOC), acid neutralisation capacity and chloride.

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<sup>43</sup> Hall D and Drury D, *Landfill Directive Waste Acceptance Criteria: A perspective of the UK's contribution to the Technical Adaptation Committee, Modelling subgroup*, Proceedings of Waste 2002, pp 72-81, The Waste Conference Ltd, Coventry ISBN 0-9539301-1-4

<sup>44</sup> O. Hjelmar, H.A. Van Der Sloot, D. Guyonnet, R.P.J.J. Rietra, A. Brun & D.H. Hall (2001) *Development of Acceptance Criteria for Landfilling of Waste: An Approach Based on Impact Modelling and Scenario Calculations*. Proc 8<sup>th</sup> International Landfill Symposium, Sardinia.

Logically, these limit values must then apply to any non-hazardous wastes deposited in the same cell. It was agreed that the logic of ensuring that leaching should not increase applied equally to landfills for hazardous waste. They therefore applied the same parameters (but different values) to those landfills.

The limit values are described in detail in earlier sections of this document.

### **Other scenarios**

The process described above is such that in certain situations the waste acceptance criteria may be insufficient. In particular:

- Are there any specific parameters present in the waste that should be incorporated in the risk assessment in addition to those in the tables of limit values provided in the Council Decision?
- Is the environmental context of the site such that the risk assessment suggests limit values lower than those in the Council Decision? This would apply where the landfill or its context are more sensitive than the scenario modelled by the sub-group (see references on the previous page).
- Is the mix of wastes to be accepted at a landfill for non-hazardous waste very different from a typical mixed municipal solid waste (MSW) landfill? If so, might the leachate be outside the compositional range normally expected?

In these situations, a site-specific risk assessment may be required. Please note, however, that the Council Decision allows Member States to introduce more stringent measures, but not less stringent ones.

Site-specific risk assessment is discussed further in Section 9.

# 12 References

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