Waste Classification

Guidance on the classification and assessment of waste (1st Edition v1.1.NI)

Technical Guidance WM3

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List of Abbreviations

AH	Absolute hazardous
AN	Absolute non-hazardous
ATP	Adaptation to technical progress
AWCCT	Asphalt waste containing coal tar
BaP	Benzo[a]pyrene
BSI	British Standards Institute
CAS	Chemical Abstract Service
CEN	European Committee for Standardisation
CFC	Chlorofluorocarbon
CLI	Classification and Labelling Inventory
CLP	Classification, Labelling and Packaging of Substances Regulation (EC 1272/2008) European
EC	Community
ECHA	European Chemicals Agency
ECVAM	European centre for the validation of alternative methods
EEC	European Economic Community
ELV	End of Life Vehicle
EU	European Union
GHS	Globally Harmonised System
HCFC	Hydrochlorofluorocarbon
HFC	Hydrofluorocarbon
HSE	Health and Safety Executive
IARC	International Agency for Research on Cancer
LoW	List of Waste
LoWD	List of Wastes Decision (2002/532/EC)
MFSU	Manufacture, formulation, supply and use.
MH	Mirror hazardous
MN	Mirror non-hazardous
NIEA	Northern Ireland Environment Agency
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
POP	Persistent Organic Pollutant
REACH	Registration, evaluation, authorisation and restriction of chemicals Regulation (EC 1907/2008)
SDS	Safety Date Sheet
SEPA	Scottish Environment Protection Agency
SoS	Secretary of State
STP	Standard temperature and pressure (25ºC and 1 atmosphere pressure)
TPH	Total Petroleum Hydrocarbons
WEEE	Waste electronic and electrical equipment
WFD	Waste Framework Directive (2008/98/EC)
XRD	X-Ray Diffraction

Introduction

Overview

As part of your waste duty of care you must classify the waste your business produces:

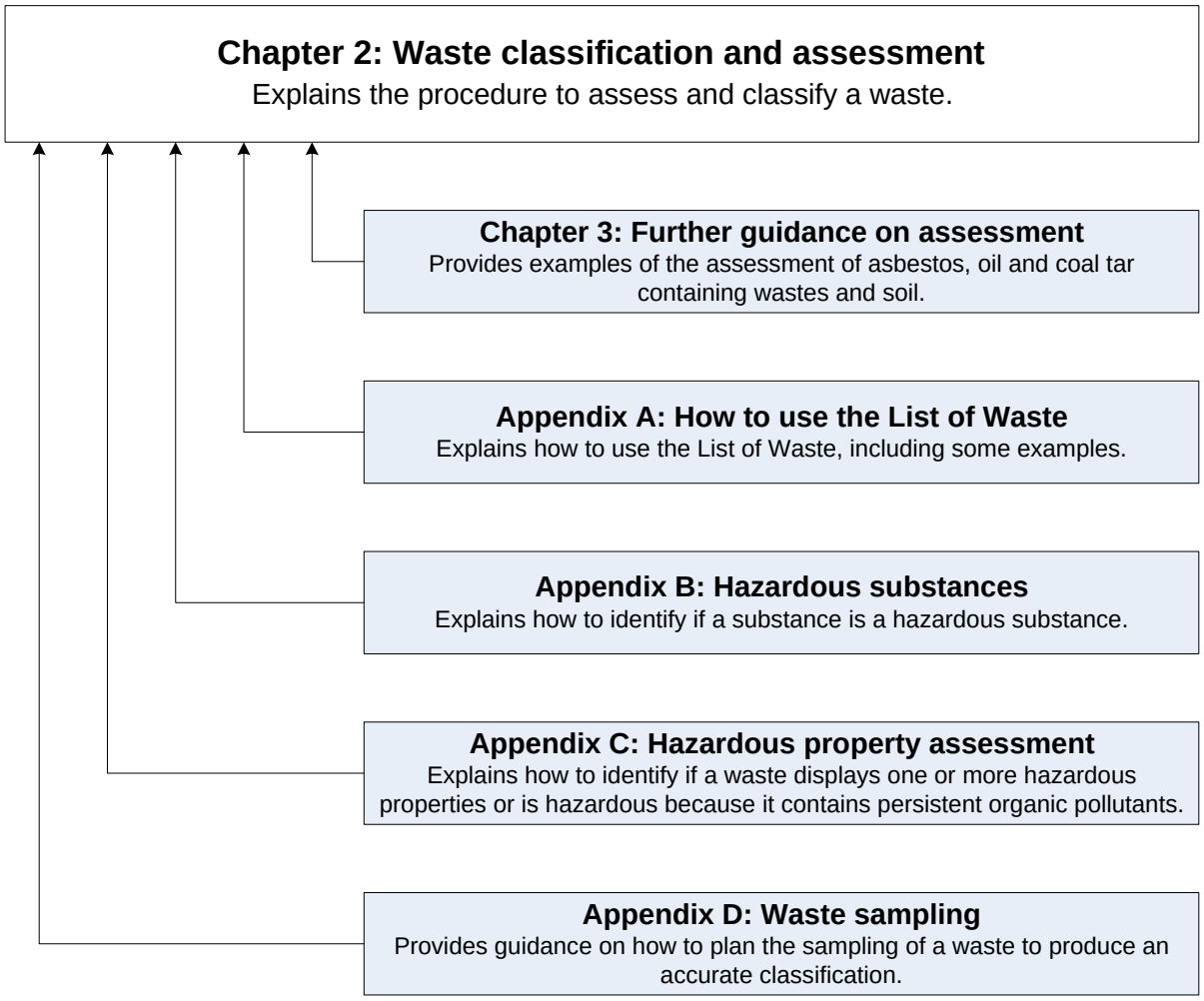
- before it is collected, disposed of or recovered
- to identify the controls that apply to the movement of the waste
- to complete waste documents and records
- to identify suitably authorised waste management options
- to prevent harm to people and the environment.

You should use this guidance if you produce, manage or regulate waste in Northern Ireland. If you are in England, Scotland or Wales you should use version 1.1.GB instead.

For most wastes, you will need to identify if the waste has a hazardous property before you can classify or describe it.

This guidance explains how to assess if the waste displays a hazardous property and how to classify it.

Chapter 2 provides the procedure for waste classification and assessment. This procedure uses the supporting information provided in five appendices as shown below.



Waste classification and assessment

Introduction

This chapter explains how to classify a waste and identify its hazardous properties.

You need to classify each waste so you can describe it. The classification:

- must be worked out before the waste is moved, disposed of or recovered
- must be included on waste documents and records
- determines the controls that apply to movement of the waste
- is needed to identify a suitably authorised waste management option

Waste classification and assessment procedure

Steps to **classify** the waste

1. check if the waste needs to be classified
2. identify the code or codes that may apply to the waste
3. identify the assessment needed to select the correct code

Steps to **assess** the waste

4. determine the chemical composition of the waste
5. identify if the substances in the waste are 'hazardous substances' or 'Persistent Organic Pollutants'
6. assess the hazardous properties of the waste
7. assign the classification code and describe the classification code

This procedure is a general guide, it applies in most circumstances and must be used with the supporting appendices. If you're unsure seek advice from a competent person.

Step 1: Check if the waste needs to be classified

You need to ensure the material is waste, and needs to be classified.

Nearly all household, commercial and industrial wastes do need to be classified. This includes waste from domestic households.

The material does not need to be classified if it's either:

- not waste, or
- a waste that is excluded from classification

See box 2.1 for wastes excluded from classification entirely, or excluded where they are covered by separate legislation.

If the waste you're trying to classify is listed in Box 2.1, check domestic legislation to see how these wastes are regulated in each country. This is particularly important if the waste is radioactive or excluded by Article 2(2) of the Waste Directive.

See the Legal definition of waste guidance - Publications - GOV.UK for additional guidance on what is waste and the listed exclusions for England, Wales and Northern Ireland.

If the material is waste, and needs to be classified, proceed to step 2.

Box 2.1: Text from Article 2 of the Waste Directive - Exclusions from the Scope

'1: The following shall be excluded from the scope of this Directive:

a) gaseous effluents emitted into the atmosphere;
b) land (in situ) including unexcavated contaminated soil and buildings permanently connected with land;
c) uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated;
d) radioactive waste;
e) decommissioned explosives;
f) faecal matter, if not covered by paragraph 2(b), straw and other natural non-hazardous agricultural or forestry material used in farming, forestry or for the production of energy from such biomass through processes or methods which do not harm the environment or endanger human health.

2: The following shall be excluded from the scope of this Directive to the extent that they are covered by other Community legislation:

a) waste waters;
b) animal by-products including processed products covered by Regulation (EC) No 1774/2002, except those which are destined for incineration, landfilling or use in a biogas or composting plant;
c) carcasses of animals that have died other than by being slaughtered, including animals killed to eradicate epizootic diseases, and that are disposed of in accordance with Regulation (EC) No 1774/2002;
d) waste resulting from prospecting, extraction, treatment and storage of mineral resources and the working of quarries covered by Directive 2006/21/EC of the European Parliament and of the Council of 15 March 2006 on the management of waste from extractive industries' (see note below).

'3: Without prejudice to obligations under other relevant Community legislation, sediments relocated inside surface waters for the purpose of managing waters and waterways or of preventing floods or mitigating the effects of floods and droughts or land reclamation shall be excluded from the scope of this Directive if it is proved that the sediments are non-hazardous.'

Note: The Mining Waste Directive (2006/21/EC) uses the definition of hazardous waste. References in this document to 'directive waste' includes waste within the scope of the Mining Waste Directive.

Step 2: identify the code or codes that may apply to the waste

The second step is to identify how the waste is classified in the List of Waste (LoW).

This classification identifies what assessment is needed before a LoW code can be assigned to the waste.

List of Waste (LoW) is a catalogue of all wastes divided into 20 chapters. The chapters must be used in the correct order of precedence.

The chapters contain both the classification codes and the descriptions of each code (together referred to as an 'entry' in the list)

You need to read **Appendix A** which:

- contains a copy of the List of Waste (includes the code, it's description, entry type and whether there is a worked example available)
- explains how to use the list
- provides information on the different types of entry and how each is assessed

This will help you identify the most appropriate code(s). Some codes are linked so it's common to identify more than one code at this stage.

Once you've done this you proceed to step 3.

Step 3: identify the assessment needed to select the correct code(s)

You now need to work out if an assessment is needed and how it affects the classification of the waste.

The assessment needed depends on the type of code(s) identified. Codes are divided into four types of entry:

- wastes that may be hazardous or non-hazardous, known as 'mirror hazardous' and 'mirror non-hazardous' entries
- wastes that are always hazardous, known as 'absolute hazardous' entries
- wastes that are always non-hazardous, known as 'absolute non-hazardous' entries.

The information provided in this guidance is suitable for most wastes. In a few cases the list of wastes contains complex linkages between several entries of different types – you should seek further advice about these. You must consider all relevant linked entries in order of precedence - see **Appendix A** for further information.

'mirror hazardous' or 'mirror non-hazardous' entries

If the waste is classified under 'mirror hazardous' or 'mirror non-hazardous' entries you will need to continue with the assessment of hazardous properties in steps 4 to 7. This will be used to

- identify which code applies, and
- complete the hazardous waste consignment note.

Waste holders have a duty to determine if a "mirror entry" waste is hazardous or non-hazardous. A list of waste code cannot be assigned until steps 4 to 7 have been completed.

Appendix A also gives additional advice on how mirror entries that refer generally to hazardous substances or only to one specific hazardous substance are assessed.

'absolute hazardous' entry

If a waste is classified as an 'absolute hazardous' entry, you must use that code. The waste is hazardous waste and further assessment cannot change the classification. Steps 4 to 7 are not used for classification purposes.

You must assess your waste to determine which hazardous properties it displays to complete a hazardous waste consignment note. Follow steps 4 to 7 for hazardous property assessment

There are exceptions where 'absolute hazardous' entries are linked to other entries and additional consideration may be needed. The other entries may need to be considered to determine if they are more appropriate to the waste.

You can find additional advice in **Appendix A** on how unusual entries of this type, for example those that relate to the presence or absence of hazardous components, are applied.

'absolute non-hazardous' entries

If a waste is classified as an 'absolute non-hazardous' entry, in most cases it is non-hazardous without any further assessment and you can proceed to Step 7.

There are exceptions where these 'absolute non-hazardous' entries are linked to other entries and additional consideration may be needed. The other entries may need to be considered to determine if they are more appropriate to the waste.

In **Appendix A** additional advice is given on how certain atypical entries of this type are applied, for example entries that relate to the presence or absence of hazardous components.

Step 4: determine the chemical composition of the waste

To assess whether the waste has a hazardous property you first need to know its composition.

You can get information on the composition of a waste:

- from the manufacturers safety data sheet if the waste is a manufactured product whose composition has not changed - if the composition has been altered during storage or use you should not rely fully on this information
- when the waste is from a well understood industrial process and the composition of the wastes produced are well understood.
- by sampling and analysing the waste to determine its composition – you must read **Appendix D** before undertaking any sampling, to ensure that sampling is appropriate, representative and reliable

Chemical analyses (particularly for inorganic substances) do not always identify the specific components but may only identify the individual anions and cations. In such cases, the waste holder may need to determine what precise substances are likely to be present either by further analysis or by applying knowledge of the process / activity that produced the waste. If there is any doubt, the worst case substance should be considered to be present. See step 5 for further information on 'worst case' substances.

Once you've determined the composition proceed to step 5.

What to do if you do not know the composition of the waste

You should make all reasonable efforts to determine the composition of the waste.

This information is required to both:

- classify mirror entry wastes
- complete a consignment note for hazardous waste prior to the waste being removed from the premises of production

Where the composition of a mirror entry waste is not known and genuinely cannot be determined the mirror entry waste must be classified under the 'mirror hazardous' entry.

Although direct testing methods are available for some hazardous properties (for example flammability) in step 6, they are not available for all properties. So direct testing cannot be used to classify a waste of unknown composition as non-hazardous.

Step 5: identify if the substances in the waste are 'hazardous substances' or 'Persistent Organic Pollutants'

Once you have determined the chemical composition you need to check if any of those chemicals are

- 'hazardous substances', or
- persistent organic pollutants (POPs)

Appendix B explains how to identify if a substance is a 'hazardous substance' and the hazard statement codes assigned to it.

Box 2.2 lists the POPs that are used for waste classification and have to be considered in step 6.

Box 2.2 Persistant Organic Pollutants used for waste classification

polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF),

DDT (1,1,1-trichloro-2,2-bis (4-chlorophenyl)ethane),

chlordane,

hexachlorocyclohexanes (including lindane),

dieldrin,

endrin,

heptachlor,

hexaclorobenzene,

chlordecone,

aldrine,

pentachlorobenzene,

mirex,

toxaphene

hexabromobiphenyl

polychlorinated biphenyls (PCB's)

Once you have determined if any of the substances in the waste are hazardous substances or POPs proceed to step 6.

If the composition of the waste is known and none of the substances in the waste are hazardous substances or POPs (listed in Box 2.2) then the waste does not possess any hazardous properties. Proceed to step 7.

'Worst case' substance

Where the holder has some knowledge of the components (for example 'lead' and 'chromium'), but does not know which specific substances, are present they must identify the 'worst case' substance(s) (for example 'lead chromate') for each component for use in Step 6.

The worst case substance should be determined separately for each hazardous property and is the substance, or combination of substances, that may reasonably exist in the waste and that is most likely to result in each hazardous property applying.

The worst case substance can be different for each hazardous property. For example, if chemical substance A has a carcinogenic hazard statement code and chemical substance B has a mutagenic hazard statement code both substances would have to be considered (one for each of the two hazardous properties).

The term 'reasonable' indicates that substances that cannot exist within the waste because, for example, of their physical and chemical properties can be excluded.

Step 6: Assess the hazardous properties of the waste

In step 6 you must consider all hazardous properties. These are numbered HP 1 to HP 15.

There are three methods to work out if a waste displays hazardous properties. These are:

- calculation - referring to a concentration limit for a hazard statement code (s),
- testing to prove whether a particular hazardous property is present or not (typically used for the physical properties – explosive, oxidising, and flammable), or
- the safety data sheet if the waste is a manufactured product whose composition has not changed, for that specific product.

At this point you should know what substances are present in the waste (or have assumed the worst case substances) and what hazard statement codes they have. These hazard statement codes determine what hazardous properties you need to consider. Table 2.1 shows which hazardous properties are associated with each hazard statement code and where appropriate a concentration limit. See Appendix C for instructions on how to assess each hazardous property, based on these hazard statement codes.

If the waste is classified under a 'mirror hazardous' and 'mirror non-hazardous' entry you must also consider POPs at this stage. Appendix C16 lists the POPs you must consider, and the concentration limit that applies to each.

Products are often labelled with hazard pictograms (see Table 2.2). If a pictogram is present a hazardous property is likely to apply. The absence of a pictogram does not mean that there are no hazardous properties.

See chapter 3 for examples of assessing hazardous properties for construction and demolition waste containing coal tar or asbestos, waste soil, waste oil and wastes containing oil.

Mirror entries referring to a specific hazardous substance or property

Some mirror entries in the LoW refer to a specific hazardous substance or a specific hazardous property.

For these entries assessing the hazardous properties must be done in two stages.

The first step (used for classification) is to assess the waste to determine if it displays:

- a hazardous property due to the specific substance named in the entry, or
- the specific hazardous property named in the entry

or contains POPs at or above the concentration limit

If the waste does display a hazardous property or contains POPs, then as the second step you must consider all the hazardous properties and hazardous substances. This is used to complete the consignment note.

Step 7: assign the classification code and describe the hazardous properties

At this stage the types of entries identified in steps 2 and 3 are important.

If you have identified entries with a different order of precedence (see Appendix A) you must consider the entries in that order of precedence. You can only consider an entry with a lower order of precedence if no appropriate entry exists at the higher level.

If the waste is classified under an 'absolute hazardous' entry:

- you must use the classification code provided
- the waste is hazardous waste
- hazardous property assessment is not used for classification purposes
- the composition and hazardous properties identified in steps 4 to 6 are used only to complete the consignment note

Key Point : 'absolute hazardous' wastes with no hazardous properties

A waste that falls under an absolute hazardous entry (eg any non-edible oil) is always hazardous. That entry must be used.

If that waste has no hazardous properties the absolute hazardous entry still applies. The law does not allow another entry to be applied to that waste.

If the waste was classified under 'mirror hazardous' and 'mirror non-hazardous' entries that refer generally to hazardous substances, then:

- the 'mirror hazardous' code must be assigned if the waste displays a hazardous property or contains POPs above the specified concentration limits
- the waste is hazardous waste, and
- the composition, hazardous properties, and POPs identified in steps 4 to 6 are also used to complete the consignment note

- when the waste does not display a hazardous property, and does not contain POPs, the 'mirror non-hazardous' code can be assigned

If the waste was classified under 'mirror hazardous' and 'mirror non-hazardous' entries that refer to a specific hazardous substance or hazardous property, then:

- the 'mirror hazardous' code must be assigned if the waste displays a hazardous property as a result of that specific substance, displays that specific property, or contains POPs above the specified concentration limits
- the waste is hazardous waste, and
- the composition, all hazardous properties, and POPs identified in steps 4 to 6 are then used to complete the consignment note
- when the waste does not display a hazardous property as a result of the specific substance, does not display the specific hazardous property, and does not contain POPs, the 'mirror non-hazardous' code can be assigned

If the waste was classified under an 'absolute non-hazardous' entry, noting the additional advice given in step 3 and appendix A, you must use the absolute non-hazardous code. The waste should be managed in line with Duty of Care Regulations and other applicable legislation. If a waste classified as 'absolute non-hazardous' displays a hazardous property you must include this on the waste transfer note. If you believe an 'absolute non-hazardous' waste may display a hazardous property, use steps 4 to 6 to assess this.

Table 2.1 | Hazardous properties and hazard statement codes

Hazard statement	Description	Hazard Class and Category In Table 3.1 of CLP		Threshold[2]	Hazardous Property
H200	Unstable explosives	Unst. Expl	n/a	See Appendix C1	HP 1
H201	Explosive; mass explosion hazard.	Expl.	1.1	See Appendix C1	HP 1
H202	Explosive, severe projection hazard	Expl.	1.2	See Appendix C1	HP 1
H203	Explosive; fire, blast or projection hazard	Expl.	1.3	See Appendix C1	HP 1
H204	Fire or projection hazard.	Expl.	1.4	See Appendix C1	HP 1
H205	May mass explode in fire.	Expl.	1.5	See Appendix C15	HP 15
H220	Extremely flammable gas.	Flam. gas	1	See Appendix C3	HP 3
H221	Flammable gas.	Flam. gas	2	See Appendix C3	HP 3
H222	Extremely flammable aerosol.	n/a	n/a	See Appendix C3	HP 3
H223	Flammable aerosol.	n/a	n/a	See Appendix C3	HP 3
H224	Extremely flammable liquid and vapour.	Flam. Liq.	1	See Appendix C3	HP 3
H225	Highly flammable liquid and vapour.	Flam. Liq.	2	See Appendix C3	HP 3
H226	Flammable liquid and vapour.	Flam. Liq.	3	See Appendix C3	HP 3
H228	Flammable solid.	Flam. Sol.	1	See Appendix C3	HP 3
H230	May react explosively even in the absence of air	Chem. Unst. Gas	A	n/a	n/a
H231	May react explosively even in the absence of air at elevated pressure and/or temperature	Chem. Unst. Gas	B	n/a	n/a
H240	Heating may cause an explosion.	Self-React.	A	See Appendices C1 & C3	HP 1 HP 3
		Org. Perox.	A		
H241	Heating may cause a fire or explosion.	Self-React.	B	See Appendices C1 & C3	HP1 HP 3
		Org. Perox.	B		

Hazard statement	Description	Hazard Class and Category In Table 3.1 of CLP		Threshold[2]	Hazardous Property
H242	Heating may cause a fire.	Self-React.	C, D, E, F	See Appendix C3	HP 3
		Org. Perox.	C, D, E, F		
H250	Catches fire spontaneously if exposed to air.	Pyr. Liq.	1	See Appendix C3	HP 3
		Pyr. Sol.	1		
H251	Self-heating: may catch fire.	Self-heat.	1	See Appendix C3	HP 3
H252	Self-heating in large quantities; may catch fire.	Self-heat.	2	See Appendix C3	HP 3
H260	In contact with water releases flammable gases which may ignite spontaneously.	Water-react.	1	See Appendix C3	HP 3
H261	In contact with water releases flammable gases.	Water-react.	2	See Appendix C3	HP 3
H270	May cause or intensify fire; oxidiser.	Ox. Gas	1	See Appendix C2	HP 2
H271	May cause fire or explosion; strong oxidiser.	Ox. Sol.	1	See Appendix C2	HP 2
H272	May intensify fire; oxidiser.	Ox. Sol	2, 3	See Appendix C2	HP 2
H280	Contains gas under pressure; may explode if heated.	n/a	n/a	n/a	n/a
H281	Contains refrigerated gas; may cause cryogenic burns or injury.	n/a	n/a	n/a	n/a
H290	May be corrosive to metals.	Met. Corr.	1	n/a	n/a
H300	Fatal if swallowed.	Acute Tox.	1	Sum (0.1%)	HP 6
		Acute Tox.	2	Sum (0.25%)	HP 6
H301	Toxic if swallowed.	Acute Tox.	3	Sum (5%)	HP 6
H302	Harmful if swallowed.	Acute Tox.	4	Sum (25%)	HP 6
H304	May be fatal if swallowed and enters airways.	Asp. Tox.	1	Sum (10%)	HP 5

Hazard statement	Description	Hazard Class and Category In Table 3.1 of CLP		Threshold[2]	Hazardous Property
H310	Fatal in contact with skin.	Acute Tox.	1	Sum (0.25%)	HP 6
		Acute Tox.	2	Sum (2.5%)	HP 6
H311	Toxic in contact with skin.	Acute Tox.	3	Sum (15%)	HP 6
H312	Harmful in contact with skin.	Acute Tox.	4	Sum (55%)	HP 6
H314	Causes severe skin burns and eye damage.	Skin Corr.	1A	Sum (1%)	HP 4 & 8
		Skin Corr.	1B, 1C	Sum (5%)	HP 8
H315	Causes skin irritation.	Skin Irrit.	2	See Appendix C4	HP 4
H317	May cause an allergic skin reaction.	Skin Sens.	1	Ind. 10%	HP 13
H318	Causes serious eye damage.	Eye Dam.	1	Sum (10%)	HP 4
H319	Causes serious eye irritation.	Eye Irrit.	2	See Appendix C4	HP 4
H330	Fatal if inhaled.	Acute Tox.	1	Sum (0.1%)	HP 6
		Acute Tox.	2	Sum (0.5%)	HP 6
H331	Toxic if inhaled.	Acute Tox.	3	Sum (3.5%)	HP 6
H332	Harmful if inhaled.	Acute Tox.	4	Sum (22.5%)	HP 6
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.	Resp. Sens.	1	Ind. 10%	HP 13
H335	May cause respiratory irritation.	STOT SE	3	Ind. 20%	HP5
H336	May cause drowsiness or dizziness.	STOT SE	3	n/a	n/a
H340	May cause genetic defects	Muta.	1A, 1B	Ind. 0.1%	HP 11
H341	Suspected of causing genetic defects	Muta.	2	Ind. 1%	HP 11
H350	May cause cancer	Carc.	1A, 1B	Ind. 0.1%	HP 7

Hazard statement	Description	Hazard Class and Category In Table 3.1 of CLP		Threshold[2]	Hazardous Property
H351	Suspected of causing cancer	Carc.	2	Ind. 1.0%	HP 7
H360(1)	May damage fertility or the unborn child	Repr.	1A, 1B	Ind. 0.3%	HP 10
H361(1)	Suspected of damaging fertility or the unborn child	Repr.	2	Ind. 3%	HP 10
H362	May cause harm to breast-fed children.	Lact.	n/a	n/a	n/a
H370	Causes damage to organs	STOT SE	1	Ind. 1%	HP 5
H371	May cause damage to organs	STOT SE	2	Ind. 10%	HP 5
H372	Causes damage to organs	STOT RE	1	Ind. 1%	HP 5
H373	May cause damage to organs	STOT RE	2	Ind. 10%	HP 5
H400	Very toxic to aquatic life.	Aquatic Acute	1	See Appendix C14	HP 14
H410	Very toxic to aquatic life with long lasting effects.	Aquatic Chronic	1	See Appendix C14	HP 14
H411	Toxic to aquatic life with long lasting effects.	Aquatic Chronic	2	See Appendix C14	HP 14
H412	Harmful to aquatic life with long lasting effects.	Aquatic Chronic	3	See Appendix C14	HP 14
H413	May cause long lasting harmful effects to aquatic life.	Aquatic Chronic	4	See Appendix C14	HP 14
H420	Harms public health and the environment by destroying ozone in the upper atmosphere	Ozone	1	See Appendix C14	HP 14
EUH 001(3)	Explosive when dry.	n/a	n/a	See Appendix C15	HP 15
EUH 006(3)	Explosive with or without contact with air.	n/a	n/a	n/a	n/a
EUH 014(3)	Reacts violently with water.	n/a	n/a	n/a	n/a
EUH 018(3)	In use may form flammable/explosive vapour-air mixture.	n/a	n/a	n/a	n/a
EUH 019(3)	May form explosive peroxides.	n/a	n/a	See Appendix C15	HP 15
EUH 029(3)	Contact with water liberates toxic gas.	n/a	n/a	See Appendix C12	HP 12

Hazard statement	Description	Hazard Class and Category In Table 3.1 of CLP		Threshold[2]	Hazardous Property
EUH 031[(3)]	Contact with acids liberates toxic gas.	n/a	n/a	See Appendix C12	HP 12
EUH 032[(3)]	Contact with acids liberates very toxic gas.	n/a	n/a	See Appendix C12	HP 12
EUH 044[(3)]	Risk of explosion if heated under confinement.	n/a	n/a	See Appendix C15	HP 15
(EUH 059)	Replaced by H420	See H420	See H420	See H420	HP 14
EUH 066[(3)]	Repeated exposure may cause skin dryness or cracking.	n/a	n/a	n/a	n/a
EUH 070[(3)]	Toxic by eye contact.	n/a	n/a	n/a	n/a
EUH 071[(3)]	Corrosive to the respiratory tract.	n/a	n/a	n/a	n/a

Notes:

1: H260 and H260 may be accompanied by the letter D, d, F, f, or a combination thereof. The letters do not alter the hazardous waste assessment.

2: Thresholds indicate either

- Ind. X%, where '*Ind.*' means that the concentration of the individual hazardous substance is compared to the threshold
- Sum (X%), where '*Sum*' means that the concentration of all hazardous substances with that hazard statement (and where relevant, hazard category) are added together to compare to the threshold.
- Reference to Appendix C, means refer to appendix C of this document for additional information. This be because:
  - (i) A test of the waste is required
  - (ii) A calculation is required, or
  - (iii) The concentration of substances with more than one hazard statement are added together to compare to a threshold

3: 'EUH' hazard statements are additional hazard statements listed in the Labelling section of Table 3.1 of the CLP. They are only assigned to a substance that already has another hazard statement code. A waste that contains a substance with an additional hazard statement code has additional handling risks that need to be identified, even if they are not considered for waste classification purposes.

Physical Hazards (HP1, HP2 and HP3) and concentration effects - The hazard class, category and statement codes assigned to a substance normally relate to the substance in its pure (100%) form. If a substance is not pure or is present as a component of a mixture the same physical hazards may not apply. As an example, ethanol is classified as Flam. Liq. 2: H225, which indicates that at 100% concentration it will have a flashpoint less than 23°C . However, an aqueous waste containing 4% w/w ethanol, will have a flashpoint greater than 60°C, and so will not display hazardous property HP 3 "Flammable". Where liquid wastes are concerned a flashpoint determination is probably appropriate to identify whether the waste is flammable or not.

Table 2.2 | Hazard pictograms, hazard classes, and hazardous properties

Pictogram	Physical hazard classes	Hazardous properties
	Unstable explosives	HP1 Explosive
	Explosives, divisions 1.1, 1.2, 1.3, 1.4	
	Self-reactive substances and mixtures, types A, B	
	Organic peroxides, types A, B	
	Oxidizing gases, category 1	HP 2 Oxidising
	Oxidizing liquids, categories 1, 2, 3	
	Oxidizing solids, categories 1, 2,	
	Flammable gases, category 1	HP 3 Flammable
	Flammable aerosols, categories 1, 2	
	Flammable liquids, categories 1, 2, 3	
	Flammable solids, categories 1, 2	
	Self-reactive substances and mixtures, types B, C, D, E, F	
	Pyrophoric liquids, category 1	
	Pyrophoric solids, category 1	
	Self-heating substances and mixtures, categories 1, 2	
	Substances and mixtures, which in contact with water, emit flammable gases, categories 1, 2, 3	
	Organic peroxides, types B, C, D, E, F	
No pictogram	Explosive, division 1.5	HP 15
	Explosive, division 1.6	Not applicable
	Flammable gas, category 2	HP 3 Flammable
	Self-reactive substances and mixtures, type G	Not applicable
	Organic peroxides, type G	Not applicable
	Compressed gases	No hazardous property
	Liquefied gases	
	Refrigerated liquefied gases	
	Dissolved gases	

Pictogram	Human health hazard classes	Hazardous properties
	Skin corrosion, category 1A	HP 4 Irritant HP 8 Corrosive
	Skin corrosion, categories 1B and 1C	HP 8 Corrosive
	Serious eye damage, category 1	HP 4 Irritant
	Corrosive to metals	Not applicable
	Acute toxicity (oral, dermal, inhalation), categories 1, 2, 3	HP 6 Acute Toxicity
	Respiratory sensitization, category 1	HP 13 Sensitising
	Germ cell mutagenicity, categories 1A, 1B, 2	HP 11 Mutagenic
	Carcinogenicity, categories 1A, 1B, 2	HP 7 Carcinogenic
	Reproductive toxicity, categories 1A, 1B, 2	HP 10 Toxic for reproduction
	Specific target organ toxicity following single exposure, categories 1, 2	HP 5 Specific Target Organ Toxicity / Aspiration Toxicity
	Specific target organ toxicity following repeated exposure, categories 1, 2	
	Aspiration hazard, categories 1, 2	
	Acute toxicity (oral, dermal, inhalation), category 4	HP 6 Acute Toxicity
	Skin irritation, categories 2, 3	HP 4 Irritant
	Eye irritation, category 2	
	Skin sensitization, category 1	HP 13 Sensitising
	Specific target organ toxicity following single exposure, cat. 3 • Respiratory tract irritation • Narcotic effects	HP 5 Specific Target Organ Toxicity / Aspiration Toxicity
No pictogram	Acute toxicity (oral, dermal, inhalation), category 5	Not applicable
	Reproductive toxicity – effects on or via lactation	Not applicable
Not subject to chemical labelling requirements	Not applicable	HP 9 Infectious

Pictogram	Environmental hazard classes	Hazardous properties
	Hazardous to the aquatic environment – acute aquatic hazard, category 1	HP 14 Ecotoxic
	Hazardous to the aquatic environment – long-term aquatic hazard, category 1, 2	
	Hazardous to the ozone layer	HP 14 Ecotoxic
No pictogram	Hazardous to the aquatic environment – acute aquatic hazard, categories 2, 3.	HP 14 Ecotoxic
	Hazardous to the aquatic environment – long-term aquatic hazard, categories 3, 4	HP 14 Ecotoxic

Further guidance on assessment

This chapter provides further guidance and examples to show how waste classification and assessment is applied to

1. Construction and demolition wastes containing asbestos
2. Waste containing coal tar
3. Waste soils
4. Waste oils and other wastes containing or contaminated with oil
   (a) Waste oils
   (b) and other wastes containing or contaminated with oil

1. Construction and demolition wastes containing asbestos

Asbestos is a naturally occurring silicate mineral and exists in a number of chemical types – for example **chrysotile** ('white'), **amosite** ('brown') and **crocidolite** ('blue') – either in a bonded or fibrous form. The fibres are very fine, less than 3 microns in diameter and respirable into the lung passageways where they can lodge indefinitely and penetrate tissue.

All forms of asbestos are classified the same way in a harmonised entry in the Classification and Labelling Inventory as:

- Carc. Cat 1A; H350, and
- STOT RE1; H372**

The assessment of asbestos containing waste considers both the presence of asbestos as

- fibres that are free and dispersed, and
- identifiable pieces of asbestos containing material

If the waste contains fibres that are free and dispersed then the waste will be hazardous if the waste as a whole contains 0.1% or more asbestos.

If the waste contains any identifiable pieces of suspected asbestos containing material they must be assessed as set out below. This would also apply to any dispersed fibres produced by deliberately breaking up such identifiable pieces.

Where the waste contains identifiable pieces of asbestos containing material (i.e. any particle of a size that can be identified as potentially being asbestos by a competent person if examined by the naked eye), then these pieces must be assessed separately. The waste is hazardous if the concentration of asbestos in the piece of asbestos containing material is 0.1% or more. The waste is regarded as a mixed waste and classified accordingly (see example 1 for advice on how to apply list of waste codes to mixed waste). The following codes should be assigned to the asbestos waste as appropriate:

- 17 06 05* Construction material containing asbestos MH
- 17 06 01* Insulation material containing asbestos MH

17 06 05* would normally be used in preference to 17 06 01* for the asbestos in asbestos contaminated soil and stones.

2. Waste containing coal tar

This example provides guidance on the classification of road asphalt waste containing coal tar (AWCCT) and other construction and demolition wastes containing coal tar and related materials.

This does not apply to wastes where coal tar is known not to be present.

•

Coal tar and many coal tar distillates are potentially carcinogenic hazardous substances. If the concentration of such materials is at or above 0.1% the waste would possess the hazardous property HP 7 carcinogenic.

Coal tar is complex mix of hydrocarbon compounds which have to be added to together to determine the concentration of coal tar. Therefore the 0.1% concentration must be applied to all fractions of the coal tar. Assessments based on PAH's alone are not consistent with the legislation and cannot be used to classify a waste as non-hazardous.

However, if the concentration of coal tar is known, Table 3 of the CLP uses benzo[a]pyrene (BaP) as a marker compound for carcinogenicity for certain coal tar entries. Where the concentration of BaP is less than 0.005% of the concentration of the coal tar (rather than in the waste as a whole), the coal tar is not carcinogenic and does not need to be considered for HP7.

'Black top' (road surface) waste

The following applies only to Asphalt material classified in the List of Wastes as

- 17 03 01* bituminous mixtures containing coal tar
- 17 03 02 bituminous mixtures other than those mentioned in 17 03 01

Where the concentration of benzo[a]pyrene is at or above 50 ppm (mg/kg) in the black top alone (excluding other material) then the amount of coal tar should be considered to be sufficient (0.1% or more) for the material to be hazardous and thus coded 17 03 01*.

Any sampling of black top would need to ensure that layers with different concentrations of benzo[a]pyrene are identified and sampled.

3. Waste soil

This example provides guidance on the classification of waste soil. It does not apply if the soil is not waste. See examples 1,2 and 4(b) for further advice on asbestos, coal tar and oil contamination.

The List of Waste contains two entries for soil excavated from contaminated sites:

17 05 03*	soil and stones containing hazardous substances	MH
17 05 04	soil and stones other than those mentioned in 17 05 03	MN

As these two entries are "mirrors" an assessment is required to determine which code is appropriate and therefore whether the waste is hazardous or non-hazardous.

In this example the following process has been followed (the necessary steps in any instance would have to reflect on the site specific circumstances):

- a desk survey has been carried out which has identified past uses of the site – in this case it is assumed that it was used for a variety of industrial processes including chemical metal plating
- a ground sampling plan was developed including both surface and sub-surface sampling. This included a preliminary sampling exercise to inform a more expansive sampling plan
- following analysis of the samples an environmental / human health risk assessment identified areas of the site that require remediation or soil removal
- waste soil was classified as one or subpopulations based on the characteristics of their contamination (e.g. "hotspots"). Each subpopulation was assessed separately for hazardous waste purposes
- subpopulations were excavated and stockpiled separately ensuring that only the minimum amount of incidental less contaminated material was removed. The incidental material was not considered in the assessment. Mixing of hazardous waste with other material is prohibited, and producers have a duty to separate mixed waste.
- all information relating to the site investigation was retained and passed to subsequent holders of waste.

The assessment of such waste requires multiple samples (See Appendix D for further information). To simplify presentation of this example, only one is included here.

This example follows, and should be applied in accordance with, the waste classification and assessment methodology set out in Chapter 2 of this document. Notes refer to text within the steps below.

> **Key point**: Landfill WAC analysis (specifically leaching test results) must **not** be used for waste classification and hazardous waste assessment purposes.
>
> This analysis is only applicable for landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Assessment

Table 3.3 provides the following information:

- the determinands that samples were analysed for (which should reflect contamination at the site), and their reporting units
- the analytical results obtained
- the worst case compound used for the assessment (see explanatory notes at the end of this example) (note the general compound entry for Arsenic in the CLP should not be used for worst case)
- the concentration of the worst case compound calculated from the analytical results (see explanatory text in (see explanatory notes at the end of this example)
- the hazard statement codes assigned to this worst case compound, and the hazardous properties associated with them (see explanatory notes at the end of this example)

Assess the hazardous properties of the waste

From identification of the hazardous substances and their properties in Table 3.3 the following hazardous properties need to be considered;

- HP 3 Flammable
- HP 4 / HP 8: Irritant and Corrosive
- HP 5 Specific Target Organ Toxicity (STOT)/ Aspiration Toxicity
- HP 6 Acute Toxicity
- HP 7 Carcinogenic
- HP 10 Toxic for Reproduction
- HP 11 Mutagenic
- HP 12 Produces Toxic gases in contact with water, air or acid
- HP 13 Sensitising
- HP 14 Ecotoxic

HP 3 Flammable : components of concern : TPH

- HP 3 (first and fourth indents) can be discounted as this is a solid waste without a free draining liquid phase.
- Advice from the laboratory indicated that testing for flammability was not appropriate due to the low level of TPH. The test would produce a negative result.
- The waste does not display these hazardous properties.
- If there was any uncertainty a test would be required.

Table 3.3 | **Results and elements used for subsequent assessment**

Determinand	Units	Result	"Worst Case" compound	% conc. of worst case	Hazard Class[2] and Category	Hazard Statement	Related Hazardous Property
Cyanide (total)	mg/kg	320	sodium cyanide.	0.06%	Acute Tox. 2 * Acute Tox. 1 Acute Tox. 2 * Aquatic Acute 1 Aquatic Chronic 1	H330[3] H310 H300[3] H400 H410 EUH032	HP6 HP6 HP6 HP14 HP14 HP12
Arsenic	mg/kg	530	diarsenic trioxide	0.07%	Carc. 1A Acute Tox. 2 * Skin Corr. 1B Aquatic Acute 1 Aquatic Chronic 1	H350 H300[3] H314 H400 H410	HP7 HP6 HP8 HP14 HP14
Cadmium	mg/kg	782	cadmium carbonate	0.08% (Note 1)	Acute Tox. 4 * Acute Tox. 4 * Acute Tox. 4 * Aquatic Acute 1 Aquatic Chronic 1 Carc. 1B	H332[3] H312[3] H302[3] H400 H410 H350	HP6 HP6 HP6 HP14 HP14 HP 7
Copper	mg/kg	400	copper(I) oxide	0.05%	Acute Tox. 4 * Eye Dam. 1 Acute Tox. 4 Aquatic Acute 1 Aquatic Chronic 1	H302 H318 H332 H400 H410	HP6 HP4 HP6 HP14 HP14
Lead	mg/kg	1620	lead sulphate	0.16% (Note 1)	Repr. 1A Acute Tox. 4 * Acute Tox. 4 * STOT RE 2 * Aquatic Acute 1 Aquatic Chronic 1 (Carc. 2)	H360Df H332[3] H302[3] H373**[3] H400 H410 (H351) [4]	HP10 HP6 HP6 HP5 HP14 HP14 HP7
Nickel	mg/kg	297	nickel carbonate	0.06%	Carc. 1A Muta. 2 Repr. 1B STOT RE 1 Acute Tox. 4 * Acute Tox. 4 * Skin Irrit. 2 Resp. Sens. 1 Skin Sens. 1 Aquatic Acute 1	H350i H341 H360D*** H372** H332[3] H302[3] H315 H334 H317 H400	HP7 HP11 HP10 HP5 HP6 HP6 HP4 HP13 HP13 HP14
Zinc	mg/kg	1446	zinc oxide	0.18%	Aquatic Acute 1 Aquatic Chronic 1	H400 H410	HP14 HP14
Total Petroleum Hydrocarbons (TPH)	mg/kg	12500		1.25%	Asp. Tox 1 STOT RE2 Muta. 1B Carc. 1B Repr. 2 Aquatic Chronic 2 (Flammable?)	H304 H373 H340 H350 H361d H411 (?)	HP5 HP5 HP11 HP7 HP10 HP14 HP 3
Benzo[a]pyrene (BaP)	mg/kg	0.23					
pH		8.7					

Supporting Notes for Table 3.3:

1. Asbestos, Antimony, Barium, Hexavalent Chromium, Mercury, Molybdenum, PCBs, Selenium, PCB's and other Persistent Organic Pollutants were analysed for but were not detected in this sample.
2. The classification presented here are based on Table 3 of the CLP. With the exception of note 4 below, and to simplify this example, we have not attempted identify any additional properties of the compounds listed. This would need to be done, as explained in Appendix B, to classify a waste soil.
3. Acute Tox. And STOT hazard classes marked with a '*' are minimum classifications. The actual classification may be more severe and needs to be determined. For illustrative purposes, to simplify this example, we have not done so here.
4. Inorganic lead compounds are classified as carcinogenic by IARC. The carcinogenic classification of these compounds needs to be determined in accordance with Appendix B. H351 have been used here for illustrative purposes only.
5. Lead sulphate and sodium cyanide are classified under harmonised group entries.
6. The entries from cadmium and lead are also qualified by Note 1, which enables the use of metal cation concentration for the assessment.

Analytical results and use of moisture in adjusting concentrations

The laboratory may report results as "dry weight" or similar. The hazardous waste classification uses concentrations of substances in the waste. Dry weight need be converted to actual concentrations. Check with the laboratory before doing so, as laboratories may report moisture in different ways.

Chemical Speciation and worst case compounds

Waste classification and assessment of hazardous waste normally needs the hazardous substances present to be identified. In this example the initial analysis has identified certain cations and an anion but does not identify the precise compounds that are present. At this point there are two options:

- further analysis using other techniques (for example X-Ray Diffraction, XRD) to identity the compounds present. This can be expensive and needs minimum levels of substances for detection purposes, or
- use the initial analysis, knowledge of the properties of the soil in the particular case that may affect speciation. This includes information on the history of the site and likely contaminants associated with its use to determine the worst case compounds that could plausibly be associated with the waste soil at this site

Other data sources may provide further information on the types of contamination associated with certain industries, processes or materials. Compounds that are not consistent with site history and the analysis, or that have chemical properties that mean they cannot exist in the waste, can in some circumstances be discounted.

Due to the site/process specific variability of worst case compounds, 'generic' worst case compounds (and electronic tools and models that employ them) should not be used without first establishing that they are applicable to the specific waste in question. The worst case for Arsenic, for example, will normally be a harmonised entry in Table 3 of the CLP for specific oxide rather than the harmonised general compound entry.

As noted above we have chosen worst case compounds specific to this particular example and these should not be used for other contaminated soils without first establishing that they are applicable.

Concentration of worst case compound

An example of how a compound concentration is calculated is provided here for zinc oxide:

(i) Analysis indicates that 1446 mg/kg of zinc (0.14%) is present in the waste soil

(ii) The actual worst case zinc compound in the soil is suspected (in this case) to be zinc oxide. (ZnO)

(iii) The atomic weight of zinc is 65.4, and for oxygen is 16

(iv) The concentration of zinc oxide in the soil is therefore

$$\frac{(65.4 + 16)}{65.4} \times 1446 = 1800.0 \text{ mg/kg } (0.18\%)$$

Where the compound is assigned Note 1 by the CLP the metal cation concentration can be used directly, without determining the concentration of the compound.

HP 4 Irritant / HP 8 Corrosive: components of concern: diarsenic trioxide, copper (1) oxide and nickel carbonate.

These are additive hazardous properties. The concentrations of different compounds with certain hazard statement codes are added together as explained in Appendices C4 and C8.

The assessment below indicates that hazardous properties HP 4 Irritant and HP 8 Corrosive do not apply to this waste when known components were concerned.

Although much of the composition of the waste remains unknown, as the pH is <11.5, the acid/alkali reserve and in vitro tests are not considered.

Hazards	Hazard Statement Code	Hazardous Waste Concentration limit Limits	Substances to be considered	Conc.	Total	Assessment
HP8	Skin Corr. 1B H314	≥5% The concentrations of substances with H314 are additive	diarsenic trioxide	0.07% (below cut-off)	0.07%	Hazard does not apply
HP4	Skin Irrit. 2 H315	≥20% The concentrations of substances with H315 and H319 are additive.	nickel carbonate	0.06% (below cut-off)	0.06%	Hazard does not apply
HP4	Eye Dam. 1 H318	≥10% The concentrations of substances with H318 are additive	copper(I) oxide	0.05% (below cut-off)	0.05%	Hazard does not apply

HP 5 Specific Target Organ Toxicity / Aspiration Toxicity : components of concern: nickel carbonate, lead sulphate, TPH

This assessment of STOT uses individual substance concentrations.

- The individual concentration of each H372 substance (nickel carbonate, 0.06%) is less that the 1% concentration limit for HP 5
- The individual concentration of each H373 substance (lead sulphate, 0.16%) is less than the 10% concentration limit for HP 5 (see note 3 in the supporting notes to Table 3.3 above)

Aspiration Toxicity is additive hazardous property. The concentration of different compounds with certain hazard statement codes are added together as explained in Appendix C5.

- The total concentration of H304 substances (TPH, 1.25%) is less than the 10% concentration limit for HP 5.
- The waste does not display the hazardous property HP 5.

HP 6 Acute Toxicity: components of concern: sodium cyanide, nickel carbonate, lead sulphate, cadmium carbonate, copper (I) oxide, diarsenic trioxide

This is an additive hazardous property. The concentration of different compounds with certain hazard statement codes are added together according to the procedures explained in Appendix C6.

See note 3 in the supporting note to table 3.3.

- The cut-off (the level below which a substance can be excluded from the assessment) is however applied to each substance before this addition takes place. Therefore, in this example:Sodium cyanide is below the 0.1% cut off for H300, H310 and H330.
- Diarsenic trioxide is below the 0.1% cut off for H300
- Nickel carbonate is below the 1% cut off for H302 and H332
- Cadmium carbonate is below the 1% cut off for H302, H312 and H332
- Lead sulphate is below the 1% cut off for H302 and H332
- Copper (I) oxide is below the 1% cut of for H302 and H332
- The waste does not display the hazardous property HP 6

HP 7 Carcinogenic: components of concern: nickel carbonate, lead sulphate, diarsenic trioxide, cadmium carbonate, TPH

This is not an additive hazard. The concentration of each individual substance is compared to the concentration limit.

- Diarsenic trioxide at 0.07% is below the 0.1% concentration limit for HP 7 (H350)
- Nickel carbonate at 0.06% is below the 0.1% concentration limit for HP 7(H350)
- Cadmium carbonate is subject to Note 1, which means the concentration of cadmium alone is used. The concentration of cadmium at 0.08% is below the 0.1% concentration limit for HP 7 (H350).
- Lead sulphate is also subject to Note 1. The concentration of lead at 0.16% is below the 1% concentration limit for HP 7 (H351). Read note 4 to table 3.3.
- The laboratory has confirmed that the hydrocarbon profile is inconsistent with the oil being diesel or weathered diesel. TPH at 1.25% is present above the 0.1% concentration limit for HP 7 (and HP 11) (H350 and H340). So were considered further using marker compounds.

  If the concentration of Benzo-a-pyrene (BaP) is less than 0.01% of the concentration of TPH, the oil is not carcinogenic or mutagenic. The TPH concentration is 12500 mg/kg so the BaP concentration limit is 1.25 mg/kg (0.01% of the TPH). The BaP concentration is less than this, at 0.23 mg/kg, so the oil is not carcinogenic or mutagenic.
- The waste does not display the hazardous property HP 7 Carcinogenic.

Note on Oil contamination and TPH:

- In most circumstances the oil contaminating soil and stones should be assessed as an 'unknown oil' as set out in Example 3.
- Oils may contain a range of hydrocarbons, so the presence of Diesel Range Organics (DRO) does not enable the assessor to conclude that diesel is present. These hydrocarbons may have arisen from other oils.
- Therefore contaminating oil must not be assessed as diesel, unless it is **known** that this is the case (for example: if there is a documented site record of a spill of diesel relating to the specific hotspot where the sample was taken, or the laboratory analysis produces a hydrocarbon profile consistent with diesel or weathered diesel being the contaminating oil).

HP 10 Toxic for reproduction; components of concern: Lead, Nickel carbonate, and TPH

This is not an additive hazard. The concentration of each individual substance is compared to the concentration limit.

- Lead at 0.16% is below the 0.3% concentration limit for HP 10 (H360)
- Nickel carbonate at 0.06% is below the 0.3% concentration limit for HP10(H360)
- The TPH concentration is below the 3% concentration limit for HP 10 (H361).
- The waste does not display the hazardous property HP 10 Toxic for reproduction.

HP 11 Mutagenic : components of concern : Nickel carbonate, TPH

This is not an additive hazard. The concentration of each individual substance is compared to the concentration limit concentrations.

- Nickel carbonate at 0.06% is below the 1% concentration limit for HP 11 (H341)
- See HP 7 for information on TPH
- The waste does not display the hazardous property HP 11 Mutagenic.

HP 12 Produces toxic gases in contact with water, air or acid: components of concern : sodium cyanide

- The concentration of sodium cyanide (EUH032) is less than the 0.2% concentration limit calculated in Appendix C12
- The waste does not display the hazardous property HP12 Produces toxic gases in contact with water, air or acid.

HP 13 Sensitising : components of concern : Nickel carbonate

This is not an additive hazard. The concentration of each individual substance is compared to the concentration limit concentrations.

- Nickel carbonate at 0.06% is below the 10% concentration limit for HP 13 (H317 and H334)
- The waste does not display the hazardous property HP 13 Sensitising.

HP 14 Ecotoxic: Components of concern: Sodium cyanide, Diarsenic trioxide, Cadmium carbonate, Copper (I)oxide, Lead sulphate, Nickel carbonate, Zinc Oxide, and TPH

This follows the calculation method using hazard statements as set out in Appendix C14 of WM3. The risk phrase method could be used as an alternative.

Step 1 – The waste is not a manufactured product so this does not apply.

Step 5 : the waste contains 7 metal compounds with H400 and H410 and TPH with H411 hazard statements.

Applying the generic cut-off values (Table 14.2) only Lead Sulphate, Zinc Oxide and TPH need to be considered further.

Substance	Concentration	Hazard Statements
Lead Sulphate	0.16% (Note 1)	H400, H410
Zinc Oxide	0.18%	H400, H410
TPH	1.25%	H411

Step 6 – Applying equations 2 to 4 in order equation 3 indicates that the waste possesses hazardous property HP 14 (see below).

- Equation 2 (0.16% +0.18%) = 0.34% is less than 25%
- Equation 3 (100 x 0.16%) + (100 x 0.18%) + (10 x 1.25%) = 46.5% which is greater than 25%
- As Equation 3 has shown the waste to be Ecotoxic Equation 4 is not required

Summary

The concentration limit value was exceeded for the hazardous property HP 14

Ecotoxic. The waste is therefore classified under the EWC code 17 05 03*, and is a

hazardous waste.

Note: If landfill is identified as the disposal route for this waste then further analysis may be required to ensure that the material meets the waste acceptance criteria (WAC) for hazardous landfill.

4. Waste oils and other wastes containing or contaminated with oil

This example applies to waste oils and any waste containing or contaminated with oil.
It does not apply to edible oils (e.g. 20 01 25), or to pure biodiesel (i.e. biodiesel that is known not to be blended or contaminated with conventional fuel). Biodiesel means vegetable oil or animal fat based diesel fuel consisting of long chain alkyl esters**.**

Introduction

The term 'Oil' covers many substances or mixtures including the broad use of mineral based fuels and lubricants, food or animal feeds and a range of other types. This example is focused upon mineral and hydrocarbon oils derived from petroleum resources. It is divided into two separate sections:

- Waste mineral oils (predominately oils, liquid fuels and lubricants, including synthetic oils and waste oil separator contents).
- Wastes, other than waste oils, that contain or are contaminated with oil (i.e. where the oil phase is not the predominant substance).

You must use this procedure for two groups set out above. You must not use the procedure set out for other wastes.

Oils are complex mixtures of hydrocarbons. However many of these complex mixtures are classified as a hazardous substance in their own right. Assessment of waste oil must therefore be based on the concentration of the oil substances as a whole. Individual hydrocarbon components are not considered separately.

4(a) Waste mineral oils

All waste oils such as fuel oil, diesel, biodiesel, or lubricating oils, etc are legally classified as a hazardous waste, under absolute hazardous entries in the List of wastes. The only two exceptions to this rule are edible oil and in certain circumstances some biodiesel (see scope)

This rule applies to all types of oil regardless of composition, hazardous properties and source. **This means that even a waste oil possessing no hazardous properties must legally be classified as a hazardous waste.**

Waste oil entries can be found in the following chapters of the List of Wastes:

- Chapter 13 Oil Wastes and Wastes of Liquid Fuels (includes all entries)
- Sub-chapters 05 01 wastes from petroleum refining (entries referring to oil only)
- Sub-chapter 12 01 wastes from shaping and physical and mechanical surface treatment of metals and plastics (entries referring to oil only)
- The following specific wastes: 080319* disperse oil, 190207* oil and concentrates from separation, 190810* grease and oil mixture from oil/water separation other than those mentioned in 190809, and 200126* oil and fat other than those mentioned in 200125

Assessment of the hazardous properties of waste oil

The hazardous properties (if any) of the oil must be described on the consignment note to accompany its movement.

Often the most accessible and complete source of information on the chemical properties of a specific oil is a Safety Data Sheet. However you should check that these are European and REACH compliant, and are therefore based on the legal classification of the relevant petroleum group in a harmonised entry in the Classification and Labelling Inventory. Marker compounds are not considered in these circumstances.

If you do not have, and cannot obtain, a Safety Data Sheet then you should use the classification for that petroleum group. Note: Harmonised entries for oils in the Classification and Labelling Inventory

are typically incomplete, in that Flammable, Toxic for Reproduction and Ecotoxic properties have not being considered. You will need to consider these in classifying the waste. Marker compounds applicable to the group may be considered in these circumstances. See section 3.3 of this example.

Waste oils are generally considered to display the following hazardous properties:

- HP 5 Specific Target Organ Toxicity (STOT)/Aspiration Toxicity
- HP 7 Carcinogenic
- HP 14 Ecotoxic

Certain oils may also possess other hazardous properties, for example unleaded petrol (a mixture of gasoline and various additives) is typically HP 3, HP 4, HP 5, HP 7, HP 10, HP 11 and HP 14.

It is important when deciding on the waste's hazardous properties that you consider the chemical changes that could have occurred within the oil once it has been used and become waste.

4(b): other wastes containing or contaminated with oil

This example explains how to identify if wastes contaminated with oil display hazardous properties due to the presence of oil. Waste oils themselves are covered in 4(a).

This section considers only the oils contaminating a waste. Where the waste contains other hazardous substances, for example metal compounds or coal tar, these must also be considered. For hazardous properties that add concentrations of different hazardous substances together (for example HP 4, HP 5, and HP 14) the additive procedures from Appendix C must be applied in conjunction with the information below.

The assessment of waste is made according to the procedure set out in chapter 2 of this document. This section provides advice on the assessment of hazardous properties, and would for example determine whether a waste classified under a hazardous/non-hazardous mirror entry in the List of Wastes was hazardous or not due to the presence of oil contamination.

Figure 3.4 is provided to guide you through the criteria, and must be used in conjunction with the supporting text.

Is the identity of the contaminating oil known or can it be identified?

The simplest scenario is where the identity of the contaminating oil is known, **or** can be identified. If the oil is known the manufacturer's or supplier's REACH compliant safety data sheet for the specific oil can be obtained and the hazard statement codes on that Safety Data Sheet can be used for the hazardous waste assessment. Some examples are provided in Table 3.4

Where the identity of the oil can only be identified down to a petroleum group level (i.e. the contaminating oil is known to be diesel, but the specific type/brand is unknown), then the classification of that petroleum group should be used in the assessment. The marker compounds associated with that petroleum group may be used to confirm carcinogenicity.

Appendix B explains how to identify the classification of hazardous substances. All properties of the oil must be considered. Ecotoxic, Flammable, Mutagenic and Toxic for Reproduction may not be listed in the oil entries.

Diesel Range Organics (DRO) may be present in many oils. Their presence cannot be assumed to mean that diesel is the contaminating oil. However if the analysing laboratory reports that the hydrocarbon profile of the oil as a whole is consistent with diesel, or weathered diesel, then the oil should be considered to be diesel.

The concentration of known oils should be determined using a method that as a minimum spans the range in which the carbon numbers for that known oil fall.

Table 3.4	Example classifications of products from some petroleum groups

Petroleum Group							
Petrol (Gasoline)		**Diesel**		**Heavy/Residual Fuel Oils**		**Crude Oils**	
Flam. Liq 1 Skin Irrit.2 Muta. 1B Carc. 1B Repr. 2 STOT SE3 Asp. Tox.1 Aquatic Chronic 2	H224 H315 H340 H350 H361d H336 H304 H411	Flam. Liq. 3 Skin Irrit. 2 Acute Tox. 4 Carc. 2 Asp.Tox. 1 STOT RE 2 Aquatic Chronic 2	H226 H315 H332 H351 H304 H373 H411	Muta. 1B Carc. 1B Acute Tox. 4 Repr. 2 STOT RE 2 Aquatic Chronic 2	H340 H350 H332 H361d H373 H411	Flam. Liq, 2 Carc. 1B Eye Irrit. 2 Asp.Tox. 1 STOT RE2 STOT SE3 Aquatic Chronic 2	H225 H350 H319 H304 H373 H336 H411

If the identity of the oil is unknown and cannot be determined

This is likely to be the case with many wastes, and in particular with contaminated soil and stones. It is important however that all reasonable efforts are made to identify the oil.

For contaminated land specific consideration must be given to the following before proceeding;

- The presence of other organic contaminants, for example solvents or coal tar that could be detected as hydrocarbons. Coal Tar is not an oil and is considered separately in example 2. Where the site history or investigation indicates the presence of hydrocarbons from oil and other sources (e.g. coal tar), and the origin of the hydrocarbons cannot reliably be assigned to either, then a worst case approach of considering the hydrocarbons both as, waste oil (in accordance with this example) and from other sources, for example coal tar should be taken.
- The presence of diesel, or weathered diesel, should be specifically considered by the laboratory and where this is confirmed by the hydrocarbon profile the oil should be assessed as a known or identified oil (diesel).

Contaminating oil, other than diesel, should be assumed to display the following hazard statements associated with the hazardous properties indicated (unless the actual classification can be determined):

- (HP 3 Flammable)
- H304 & H373 (HP 5 Specific Target Organ Toxicity (STOT)/Aspiration Toxicity),
- H340 (HP 11 Mutagenic)
- H350 (HP 7 Carcinogenic)
- H361d (HP 10 Toxic for Reproduction)
- H411 (or R51-53)(HP 14 Ecotoxic)

The assessment of the waste is based on the presence of oil. It considers each of these properties in turn using the Total Petroleum Hydrocarbons (TPH) (C_6 to C_{40}) concentration. The bullets below compare the concentration of TPH to the concentration limit concentrations set out in Appendix C for each hazardous property:

(i) If the concentration of TPH is ≥ 10% the waste will be HP 5* Specific Target Organ Toxicity (STOT)/Aspiration Toxicity

(ii) If the concentration of TPH is ≥ 3% the waste will be HP 10 toxic for reproduction.

(iii) If the concentration of TPH is ≥ 2.5% the waste will be HP 14* Ecotoxic.

(iv) If the concentration of TPH is ≥ 0.1% the waste will be HP 7 Carcinogenic **and** HP 11 Mutagenic unless the concentration of benzo-a-pyrene is <0.01% of the concentration of the TPH (this is explained in the following section)

Note '*': HP 5 Specific Target Organ Toxicity (STOT)/Aspiration Toxicity and HP 14 Ecotoxic are additive properties. Where other hazardous substances, with hazard statement codes associated with those properties, are present the additive procedures in Appendices C5 and C14 must be followed.

Flammability (HP 3) need only be considered where the oil is at sufficient concentration to make this relevant.

Use of Marker Compounds for HP 7 Carcinogenic and HP 11 Mutagenic

The assessment of HP 7 Carcinogenic and HP 11 Mutagenic follows Appendix C7 and C11 of this document. Markers are used solely to determine if the oil is classified with hazard statement codes H350/H351 (HP 7) and H340/H341 (HP 11) for use in that assessment.

The use of marker compounds is optional. If marker compounds have not been used the oil must be assumed to be carcinogenic and mutagenic. For unknown oil this means that a waste containing ≥ 0.1% TPH is hazardous waste.

These markers not applicable to other hazardous properties, for example HP 5 Specific Target Organ Toxicity (STOT)/Aspiration Toxicity and HP 14 Ecotoxic.

The use of specific hydrocarbons, for example Polyaromatic Hydrocarbons (PAH or PAC), as markers for carcinogenicity in oil is well established.

This guidance considers the use of markers for HP 7 and HP 11 in two circumstances;

- Wastes contaminated with known oil
- Wastes contaminated with unknown oil and wastes from treatment of oil contaminated waste.

Wastes contaminated with known oil (other than from the treatment of oil containing waste)

Where the identity of the contaminating oil is known, and the oil is classified as carcinogenic or mutagenic on the manufacturer's Safety Data Sheet, marker compounds must not be used for that property. The relevant marker would have been considered in the preparation of the safety data sheet. If the oil is not carcinogenic or mutagenic, and it composition has changed significantly during use, then either the oil should be classified as carcinogenic/mutagenic or the relevant marker should be reassessed.

Where the identity of the contaminating oil is not known, but the petroleum group has been established, then the appropriate marker for that petroleum group may be used unless the oil is diesel or petrol. Marker compounds must not be used for petrol or diesel:

- Diesel is carcinogenic, H351. No marker compounds apply.
- Petrol is carcinogenic H350 unless the identity is known and the safety data sheet for that particular product indicates otherwise.

For oils in other petroleum groups the CLP identifies the following three markers for use in determining the carcinogenic or mutagenic nature of the oil contaminating the waste. Only the marker(s) assigned to that group by the CLP can be used. The oil is not carcinogenic or mutagenic, where indicated by the CLP note(s) assigned to that group, if the:

- **benzene** concentration is less than 0.1% of the of the TPH concentration w/w (mg/kg);
- **1,3-butadiene** concentration is than less 0.1% than of the TPH concentration w/w (mg/kg); and
- substance contains less than **3 %DMSO extract** (relative to TPH concentration) as measured by IP 346 'Determination of polycyclic aromatics in unused lubricating base oils and asphaltene free petroleum fractions — Dimethyl sulphoxide extraction refractive index method', Institute of Petroleum, London. (Note: this method is only applicable to hydrocarbon oils and is not suitable where other additives/contaminants may be present)

Where the CLP does not assign a marker to the petroleum group, then markers must not be used for that petroleum group, H350, H351, H340 and H341 are allocated as indicated by that entry.

Markers related to the refining history are not applicable to waste. These would require the identity of the oil to be known, and should already have been determined by the manufacturer and supplier on the Safety Data Sheet.

Waste contaminated with unknown oil and waste from the treatment of oil contaminated waste.

Markers can only be used for unknown oil where all reasonable efforts have been taken to identify the specific oil or petroleum group. This might include for example site investigation, site history and laboratory analysis. Producers or holders may, as an alternative to such efforts, classify the oil as H350 (HP 7) and H340 (HP 11).

However, where a waste contaminated with known or unknown oil has been subsequently treated by a process that changes the contaminating oil, any oil contaminated residues from that treatment should be assessed as waste contaminated with an unknown oil.

Mixing or blending processes that dilute the concentration of the oil, without treating the oil itself, cannot change a carcinogenic/mutagenic oil to a non-carcinogenic/mutagenic oil

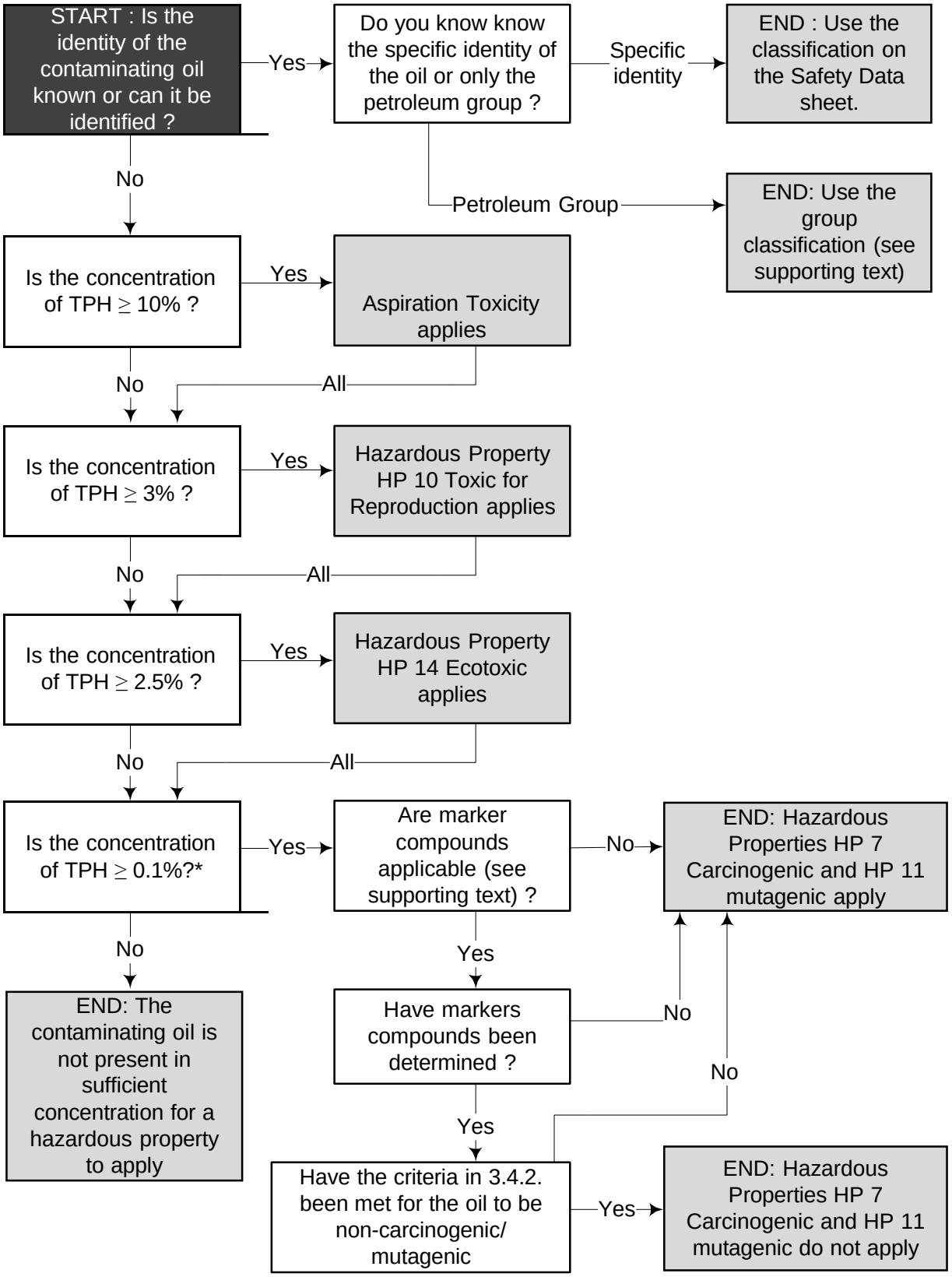
If the identity of the oil is unknown, and the petroleum group cannot be established, then the oil contaminating the waste can be classified as non-carcinogenic/mutagenic due to the presence of oil if all three of the following criteria are met:

- the waste contains **benzo[a]pyrene (BaP)** at a concentration of less than 0.01% (1/10,000th) of the TPH concentration (This is the carcinogenic limit specified in Table 3 of the CLP for BaP)
- this has been determined by an appropriate and representative sampling approach in accordance with the principles set out in Appendix D, and
- the analysis clearly demonstrates, for example by carbon bands or chromatograph, and the laboratory has reasonably concluded that the hydrocarbons present have **not** arisen from petrol or diesel

Where any one of these three criteria is not met the oil should be classified as H350 (carcinogenic) and H340 (mutagenic). Some worked examples are provided below to illustrate this.

TPH concentration (in waste)		Benzo[a]pyrene concentration limit concentration (in waste) (equivalent to 0.01% of TPH concentration)		
0.1%	1000 mg/kg	0.00001%	0.1 mg/kg	100 µg/kg
1%	10,000 mg/kg	0.0001%	1 mg/kg	1000 µg/kg
10%	100,000 mg/kg	0.001%	10 mg/kg	10,000 µg/kg

Figure A3.4 | The assessment of wastes, other than waste oils, containing or contaminated with oil



Appendix A:

How to use the List of Waste

This appendix explains how to use the List of Waste to identify the possible code or codes that the waste may be classified under.

The code or codes determines both:

- the assessment needed to identify the correct code
- whether a waste is hazardous or non-hazardous

This supports steps 2, 3 and 7 of the waste classification and assessment procedure in Chapter 2.

Introduction

The List of Waste (LoW) is the legal classification system used for classifying waste and identifying if a waste is hazardous waste.

The list also has a set of legal instructions that explain how it has to be used. It is important these are followed because the structure of the list is designed to work with these instructions.

The structure of the List of Waste (LoW)

Chapters

The LoW is divided into 20 chapters, numbered 01 to 20.

Some chapters are based on the type of industrial process or business activity that produced the waste. For example:

- **Chapter 04: Wastes from the Leather, Fur and Textile Industries**

Other chapters are based on the type of waste. For example:

- **Chapter 13: Oil Wastes and Wastes of Liquid Fuels (except edible oils, and those in chapters 05, 12 and 19)**

The titles of these chapters are important. The waste has to fall within the scope of the title to be considered within it.

Some titles, like that for chapter 13, also exclude certain wastes from that entire chapter.

The chapter titles are set out in Table A1.1

Sub-chapters

Most chapters contain a number of subchapters.

These divide the chapter into sub-groups based on either industrial process and business activity, or type of waste.

Each sub-chapter is given another two digit number (creating a four digit number with the chapter number).

For example:

- **Sub-chapter 04 02: wastes from the textile industry**
- **Sub-chapter 13 01: waste hydraulic oils**

The sub-chapter title, like the chapter title, is also important.

Individual entries

Within each sub-chapter are the classification codes for individual wastes.

These are given an additional two digit number, to create a six digit number with the chapter and subchapter numbers. For example

- 04 02 16* dyestuffs and pigments containing hazardous substances

The description accompanying the code explains the scope of the code. It may do this in a variety of ways including references to the type of waste, the activity or process that produced it, its composition, or properties.

Example : how chapter and subchapter titles interact with code descriptions

Chapter 20 contains codes for:

- **Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions**

Sub-chapter 20 01 contains codes for:

- **20 01 Separately collected fractions (except 15 01)**

Within sub-chapter 20 01 is the following six digit code

- 20 01 01 paper and cardboard

For 20 01 01 to be considered the waste must:

- be from a household (or is waste similar to that produced by a household), due to the scope of the chapter title
- be collected/co-collected as a separate fraction, due to the scope of the sub-chapter title
- not include any waste packaging, due to the exclusion of 15 01 in the sub-chapter title
- be paper or cardboard or a mixture of paper and cardboard

If the waste does not meet all four of the above criteria 20 01 01 would not be the most appropriate code.

Instructions on how to use the List of Waste

The LoW has legal instructions that explain how it must be used to ensure the correct code for a waste is identified. It is important to understand that the LoW is not a 'look up' list. To accurately identify the 'appropriate' code or codes for your waste you must both:

- consider the entire list, rather than focussing on a single process chapter
- use the chapters in the order of precedence specified in the instructions (set out in steps 1 to 5 below and illustrated in Table A1.1)

Steps 1 to 4 will help you identify the appropriate code or codes that may apply to a waste. In many cases more than one code will need to be considered at this stage.

Step 5 explains the different types of codes and how the possible codes are considered further in chapter 2 to identify the appropriate code.

Step 1 Identification by waste source

The first step is to look at Chapters 01 to 12 and 17 to 20.

These chapters refer specifically to an industry process or business activity that has produced the waste, and to municipal waste.

A business will typically have municipal wastes (chapter 20) and wastes from one or more processes or activities. A number of chapters will normally need to be considered.

If your waste falls into one of these chapters, and is listed there with one or more applicable entries, you should use the most appropriate code for your waste.

If, for example, you have a chemical surface treatment process that produces waste aqueous rinse waters, you could code them as either:

11 01 11* aqueous rinsing liquids containing hazardous substances	MH
11 01 12 aqueous rinsing liquids other than those mentioned in 11 01 11	MN

Step 5 explains how to decide which of these entries you must choose.

You must not use any six digit entry ending in '99' from the chapters considered at step 1 because more appropriate entries might be found in other chapters. See step 4.

Step 2 Check chapters 13, 14 and 15.

If no appropriate entry is found in chapters 01 to 12 or 17 to 20, then you should check chapters 13, 14 and 15 to see if the waste is listed there. '99' codes from chapters 13, 14 and 15 may be considered.

These chapters contain subchapters and codes for:

- waste oils and fuels
- waste solvents and refrigerants
- waste packaging, absorbents, filter materials, wiping cloths and protective clothing

Step 3 Check chapter 16

If there is no appropriate code or codes in chapters 01 to 15 or 17 to 20, the next step is to look in chapter 16. '99' codes from chapters 16 may be considered.

Chapter 16 contains sub-chapters and codes for many general wastes such as:

- vehicles
- electronic equipment and batteries
- chemicals
- aqueous liquid wastes

Step 4 '99' Codes

Occasionally an appropriate code or codes may not be identified in steps 1 to 3.

This is unusual, so we recommend you review steps 1 to 3 before proceeding. If you're unsure seek advice.

If a waste is from one of the industry processes 01 to 12 and 17 to 20, you can now use the 99 code that you were not able to use in Step 1. An example of a waste that is coded 99 is a separate fraction of municipal hygiene wastes (20 01 99).

You should still use the 'most appropriate' code, so shouldn't use a 99 code if a more suitable alternative is available in another chapter of the LoW. For example amalgam waste from veterinary healthcare care should be coded 18 01 10*, even though that code relates to human healthcare, as it's clearly suitable.

Step 5 Identify the type of code and assessment needed

In Steps 1 to 4 you should have selected one or more codes that may apply to the waste.

You now need to look at the 'entry type' to work out what assessment is needed to select the correct code.

In the list of waste there are four types of entry, those coloured in:

- red and labelled AH; they are known as 'absolute hazardous' wastes
- black and labelled AN; they are known as 'absolute non-hazardous' wastes
- blue and labelled MH; they are known as 'mirror hazardous' entries
- green and labelled MN; they are known as 'mirror non-hazardous' entries

The six-digit codes in the LoW that are hazardous wastes have an asterisk (*) next to them.

'Absolute hazardous' (AH) entries

'Absolute hazardous' entries, are colour-coded red and labelled AH in this Appendix. For example:

13 07 01* fuel oil and diesel AH

Wastes are simply assigned to these codes if they fit the description next to the code. This description normally refers to a type or sub-type of material (eg a filter cake or type of oil) or sometimes a source activity or process. If the waste fits the description you must assign this code.

Where the waste description next to the AH six-digit code does not have a 'specific' or 'general' reference to 'hazardous substances' - this means that the concentration of hazardous substances in the waste, and hazardous properties, must not be considered during classification. **These wastes are automatically considered hazardous.**

As hazardous waste they are marked in the LoW with an asterisk (*),

You do not need to work out what chemicals are in the waste to classify it, and find out if it's hazardous or not. But you must still find what (if any) hazardous properties the waste displays, and determine the composition, for consignment and transport.

There are some unusual 'absolute hazardous' entries that are linked to other entries. In these cases you need to determine if the waste fits the description of the 'absolute hazardous' entry or not. Some examples of this include:

- 'absolute hazardous' entries for waste oils that are distinguished by type of oil, and presence of PCBs
- 'absolute hazardous' and 'absolute non-hazardous' entries for electrical waste that are distinguished by the presence of absence or hazardous components (see example 6)

Further information is provided to explain this type of entry either as notes within the list or separate examples.

Key Point : Absolute hazardous wastes with no hazardous properties

A waste that falls under an absolute hazardous entry (eg any non-edible oil) is always hazardous.

If that waste has no hazardous properties the absolute hazardous entry still applies. The law does not allow another entry to be applied to that waste.

'Absolute non-hazardous' (AN) entries

If an entry in the LoW is not listed with an asterisk, and it does not have any link to a mirror or absolute hazardous entry, the entry is automatically not hazardous. An example is:

03 01 01 waste bark and cork AN

If the waste fits the description for that code it can be considered.

But before assigning an absolute non-hazardous entry you must check if there are any linked or related entries that also need to be considered. Examples of wastes with linked codes include:

- electrical wastes and batteries (see examples 5 and 6)
- medicines
- stabilised/solidified waste

'Mirror hazardous' (MH) and **'mirror non-hazardous' (MN)** entries

Some wastes are not automatically hazardous or non-hazardous - they are called mirror entry wastes.

These wastes have:

- a hazardous waste entry (or entries) marked with an asterisk (*), and
- an alternative non-hazardous waste entry (or entries) not marked with an asterisk

A hazardous mirror has a 'specific' or 'general' reference to 'hazardous substances' in its waste description. For example:

07 01 11* sludges from on-site effluent treatment containing hazardous substances MH

The non-hazardous mirror usually (but not always) has a defined link to its mirror using the words 'other than those mentioned in …' for example:

07 01 12 sludges from on-site effluent treatment other than those mentioned in 07 01 11 MN

This is an example of a mirror pair where the hazardous entry has a 'general' reference to a hazardous substance(s). The hazardous entry is chosen either if the waste:

- contains any hazardous substance(s) at or above levels that cause it to display a hazardous property
- persistent organic pollutants at or above the concentration limits that cause it to be hazardous

Another example of mirror entries is:

17 03 01* bituminous mixtures containing coal tar MH

17 03 02 bituminous mixtures other than those mentioned in 17 03 01 MN

This is an example of a mirror pair where the hazardous entry has a 'specific' reference to a hazardous substance, in this case coal tar. The hazardous entry is chosen only if the waste either contains:

- the particular hazardous substance (in this case coal tar) at a level that causes it to display a hazardous property
- persistent organic pollutants at or above the concentration limits that cause it to be hazardous

See Chapter 2 and Appendix C for guidance on whether the hazardous or non-hazardous mirror entry, and the assessment of hazardous properties, is applicable.

Key Point : Unusual Mirror hazardous (MH) entries

Not all Mirror hazardous (MH) entries link to a single mirror non-hazardous (MN) entry.

Some may link to absolute hazardous (AH) entries, other mirror hazardous (MH), multiple mirror non-hazardous (MN), or absolute non-hazardous entries (AN).

These entries may occur as groups of several interacting entries, and a mirror non-hazardous (MN) entry may not always be provided in the same chapter or sub-chapter of the list. These entries may fall in different steps in the procedure above.

A small number of entries refer to chemical properties (eg flammable) associated with hazardous properties, rather than hazardous substances. We have presented these here as mirror entries.

Examples of how to apply coding

This appendix includes the following general examples of how to code:

1. Co-collected and mixed wastes
2. Aqueous liquids or concentrates

The following specific examples of the coding of certain wastes are also included:

3. End of life vehicles
4. Offensive hygiene waste from non-healthcare activities
5. Batteries from municipal sources
6. Waste electronic and electrical equipment
7. Packaging wastes and contents

Note: The examples included in the previous WM2 guidance on hazardous waste have either been moved to Chapter 3 (soil, asbestos, coal tar and oily wastes), or included as alphabetical notes within the list presented here.

Table A1.1: List of Waste chapters and their order of precedence

Code	Chapter Description	Step (Order of precedence)
01	WASTES RESULTING FROM EXPLORATION, MINING, QUARRYING, AND PHYSICAL AND CHEMICAL TREATMENT OF MINERALS	1
02	WASTES FROM AGRICULTURE, HORTICULTURE, AQUACULTURE, FORESTRY, HUNTING AND FISHING, FOOD PREPARATION AND PROCESSING	1
03	WASTES FROM WOOD PROCESSING AND THE PRODUCTION OF PANELS AND FURNITURE, PULP, PAPER AND CARDBOARD	1
04	WASTES FROM THE LEATHER, FUR AND TEXTILE INDUSTRIES	1
05	WASTES FROM PETROLEUM REFINING, NATURAL GAS PURIFICATION AND PYROLYTIC TREATMENT OF COAL	1
06	WASTES FROM INORGANIC CHEMICAL PROCESSES	1
07	WASTES FROM ORGANIC CHEMICAL PROCESSES	1
08	WASTES FROM THE MANUFACTURE, FORMULATION, SUPPLY AND USE (MFSU) OF COATINGS (PAINTS, VARNISHES AND VITREOUS ENAMELS), ADHESIVES, SEALANTS AND PRINTING INKS	1
09	WASTES FROM THE PHOTOGRAPHIC INDUSTRY	1
10	WASTES FROM THERMAL PROCESSES	1
11	WASTES FROM CHEMICAL SURFACE TREATMENT AND COATING OF METALS AND OTHER MATERIALS, NON-FERROUS HYDRO-METALLURGY	1
12	WASTES FROM SHAPING AND PHYSICAL AND MECHANICAL SURFACE TREATMENT OF METALS AND PLASTICS	1
13	OIL WASTES AND WASTES OF LIQUID FUELS (except edible oils, and those in chapters 05, 12 and 19)	2
14	WASTE ORGANIC SOLVENTS, REFRIGERANTS AND PROPELLANTS (except 07 and 08)	2
15	WASTE PACKAGING, ABSORBENTS, WIPING CLOTHS, FILTER MATERIALS AND PROTECTIVE CLOTHING NOT OTHERWISE SPECIFIED	2
16	WASTES NOT OTHERWISE SPECIFIED IN THE LIST	3
17	CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)	1
18	WASTES FROM HUMAN OR ANIMAL HEALTH CARE AND/OR RELATED RESEARCH (except kitchen and restaurant wastes not arising from immediate health care)	1
19	WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE	1
20	MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS	1

Legal definitions used by the list

The following legal definitions are included in the list of waste

Term	Definition
‘hazardous substance’	‘means a substance classified as hazardous as a consequence of fulfilling the criteria laid down in parts 2 to 5 of Annex I to Regulation (EC) No 1272/2008’
‘heavy metal’	‘means any compound of antimony, arsenic, cadmium, chromium (VI), copper, lead, mercury, nickel, selenium, tellurium, thallium and tin, as well as these materials in metallic form, as far as these are classified as hazardous substances’
‘polychlorinated biphenyls and polychlorinated terphenyls’ (‘PCBs’)	‘means PCBs as defined in Article 2(a) of Council Directive 96/59/EC’. Article 2(a) says that 'PCBs means: • polychlorinated biphenyls • polychlorinated terphenyls • monomethyl-tetrachlorodiphenyl methane, Monomethyl-dichloro-diphenyl methane, Monomethyldibromo-diphenyl methane • any mixture containing any of the above mentioned substances in a total of more than 0,005 %by weight’
‘transition metals’	‘means any of the following metals: any compound of scandium, vanadium, manganese, cobalt, copper, yttrium, niobium, hafnium, tungsten, titanium, chromium, iron, nickel, zinc, zirconium, molybdenum and tantalum, as well as these materials in metallic form, as far as these are classified as hazardous substances’
‘stabilisation’	‘means processes which change the hazardousness of the constituents in the waste and transform hazardous waste into non-hazardous waste’
‘solidification’	‘means processes which only change the physical state of the waste by using additives without changing the chemical properties of the waste’
‘partly stabilised wastes’	‘means wastes containing, after the stabilisation process, hazardous constituents which have not been changed completely into non-hazardous constituents and could be released into the environment in the short, middle or long term’

Code	Description	Entry Type	Example provided
01	**WASTES RESULTING FROM EXPLORATION, MINING, QUARRYING, AND PHYSICAL AND CHEMICAL TREATMENT OF MINERALS**		
01 01	**wastes from mineral excavation**		
01 01 01	wastes from mineral metalliferous excavation	AN	
01 01 02	wastes from mineral non-metalliferous excavation	AN	
01 03	**wastes from physical and chemical processing of metalliferous minerals**		
01 03 04*	acid-generating tailings from processing of sulphide ore	AH	
01 03 05*	other tailings containing hazardous substances	MH	
01 03 06	tailings other than those mentioned in 01 03 04 and 01 03 05	MN	
01 03 07*	other wastes containing hazardous substances from physical and chemical processing of metalliferous minerals	MH	
01 03 08	dusty and powdery wastes other than those mentioned in 01 03 07	MN	
01 03 09	red mud from alumina production other than the wastes mentioned in 01 03 10	MN	
01 03 10*	red mud from alumina production containing hazardous substances other than the wastes mentioned in 01 03 07	MH	
01 03 99	wastes not otherwise specified	MN	
01 04	**wastes from physical and chemical processing of non-metalliferous minerals**		
01 04 07*	wastes containing hazardous substances from physical and chemical processing of non-metalliferous minerals	MH	
01 04 08	waste gravel and crushed rocks other than those mentioned in 01 04 07	MN	
01 04 09	waste sand and clays	AN	
01 04 10	dusty and powdery wastes other than those mentioned in 01 04 07	MN	
01 04 11	wastes from potash and rock salt processing other than those mentioned in 01 04 07	MN	
01 04 12	tailings and other wastes from washing and cleaning of minerals other than those mentioned in 01 04 07 and 01 04 11	MN	
01 04 13	wastes from stone cutting and sawing other than those mentioned in 01 04 07	MN	
01 04 99	wastes not otherwise specified	MN	
01 05	**drilling muds and other drilling wastes**		
01 05 04	freshwater drilling muds and wastes	AN	
01 05 05*	oil-containing drilling muds and wastes	AH	a
01 05 06*	drilling muds and other drilling wastes containing hazardous substances	MH	a
01 05 07	barite-containing drilling muds and wastes other than those mentioned in 01 05 05 and 01 05 06	MN	a
01 05 08	chloride-containing drilling muds and wastes other than those mentioned in 01 05 05 and 01 05 06	MN	a
01 05 99	wastes not otherwise specified	MN	a

Code	Description	Entry Type	Example provided
Note 'a' : These entries are assigned by • Type of drilling mud, and • Hazardous substances present Where the drilling mud/fluid has an oil base, the drilling mud and any associated drilling wastes are classified under 01 05 05*, and are hazardous waste. Barite or chloride based drilling muds and any associated drilling wastes are part of a mirror entry and are only hazardous (classified as 01 05 06*) if they display a hazardous property or contain POPs.			
02	**WASTES FROM AGRICULTURE, HORTICULTURE, AQUACULTURE, FORESTRY, HUNTING AND FISHING, FOOD PREPARATION AND PROCESSING**		
02 01	**wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing**		
02 01 01	sludges from washing and cleaning	AN	
02 01 02	animal-tissue waste	AN	
02 01 03	plant-tissue waste	AN	
02 01 04	waste plastics (except packaging)	AN	
02 01 06	animal faeces, urine and manure (including spoiled straw), effluent, collected separately and treated off-site	AN	
02 01 07	wastes from forestry	AN	
02 01 08*	agrochemical waste containing hazardous substances	MH	
02 01 09	agrochemical waste other than those mentioned in 02 01 08	MN	
02 01 10	waste metal	AN	
02 01 99	wastes not otherwise specified	AN	
02 02	**wastes from the preparation and processing of meat, fish and other foods of animal origin**		
02 02 01	sludges from washing and cleaning	AN	
02 02 02	animal-tissue waste	AN	
02 02 03	materials unsuitable for consumption or processing	AN	
02 02 04	sludges from on-site effluent treatment	AN	
02 02 99	wastes not otherwise specified	AN	
02 03	**wastes from fruit, vegetables, cereals, edible oils, cocoa, coffee, tea and tobacco preparation and processing; conserve production; yeast and yeast extract production, molasses preparation and fermentation**		
02 03 01	sludges from washing, cleaning, peeling, centrifuging and separation	AN	
02 03 02	wastes from preserving agents	AN	
02 03 03	wastes from solvent extraction	AN	
02 03 04	materials unsuitable for consumption or processing	AN	
02 03 05	sludges from on-site effluent treatment	AN	
02 03 99	wastes not otherwise specified	AN	
02 04	**wastes from sugar processing**		
02 04 01	soil from cleaning and washing beet	AN	

Code	Description	Entry Type	Example provided
02 04 02	off-specification calcium carbonate	AN	
02 04 03	sludges from on-site effluent treatment	AN	
02 04 99	wastes not otherwise specified	AN	
02 05	**wastes from the dairy products industry**		
02 05 01	materials unsuitable for consumption or processing	AN	
02 05 02	sludges from on-site effluent treatment	AN	
02 05 99	wastes not otherwise specified	AN	
02 06	**wastes from the baking and confectionery industry**		
02 06 01	materials unsuitable for consumption or processing	AN	
02 06 02	wastes from preserving agents	AN	
02 06 03	sludges from on-site effluent treatment	AN	
02 06 99	wastes not otherwise specified	AN	
02 07	**wastes from the production of alcoholic and non-alcoholic beverages (except coffee, tea and cocoa)**		
02 07 01	wastes from washing, cleaning and mechanical reduction of raw materials	AN	
02 07 02	wastes from spirits distillation	AN	
02 07 03	wastes from chemical treatment	AN	
02 07 04	materials unsuitable for consumption or processing	AN	
02 07 05	sludges from on-site effluent treatment	AN	
02 07 99	wastes not otherwise specified	AN	
03	**WASTES FROM WOOD PROCESSING AND THE PRODUCTION OF PANELS AND FURNITURE, PULP, PAPER AND CARDBOARD**		
03 01	**wastes from wood processing and the production of panels and furniture**		
03 01 01	waste bark and cork	AN	
03 01 04*	sawdust, shavings, cuttings, wood, particle board and veneer containing hazardous substances	MH	
03 01 05	sawdust, shavings, cuttings, wood, particle board and veneer other than those mentioned in 03 01 04	MN	
03 01 99	wastes not otherwise specified	AN	
03 02	**wastes from wood preservation**		
03 02 01*	non-halogenated organic wood preservatives	AH	
03 02 02*	organochlorinated wood preservatives	AH	
03 02 03*	organometallic wood preservatives	AH	
03 02 04*	inorganic wood preservatives	AH	
03 02 05*	other wood preservatives containing hazardous substances	MH	
03 02 99	wood preservatives not otherwise specified	MN	
03 03	**wastes from pulp, paper and cardboard production and processing**		
03 03 01	waste bark and wood	AN	
03 03 02	green liquor sludge (from recovery of cooking liquor)	AN	

Code	Description	Entry Type	Example provided
03 03 05	de-inking sludges from paper recycling	AN	
03 03 07	mechanically separated rejects from pulping of waste paper and cardboard	AN	
03 03 08	wastes from sorting of paper and cardboard destined for recycling	AN	
03 03 09	lime mud waste	AN	
03 03 10	fibre rejects, fibre-, filler- and coating-sludges from mechanical separation	AN	
03 03 11	sludges from on-site effluent treatment other than those mentioned in 03 03 10	AN	
03 03 99	wastes not otherwise specified	AN	
04	**WASTES FROM THE LEATHER, FUR AND TEXTILE INDUSTRIES**		
04 01	**wastes from the leather and fur industry**		
04 01 01	fleshings and lime split wastes	AN	
04 01 02	liming waste	AN	
04 01 03*	degreasing wastes containing solvents without a liquid phase	MH	
04 01 04	tanning liquor containing chromium	AN	b
04 01 05	tanning liquor free of chromium	AN	b
04 01 06	sludges, in particular from on-site effluent treatment containing chromium	AN	b
04 01 07	sludges, in particular from on-site effluent treatment free of chromium	AN	b
04 01 08	waste tanned leather (blue sheetings, shavings, cuttings, buffing dust) containing chromium	AN	b
04 01 09	wastes from dressing and finishing	AN	
04 01 99	wastes not otherwise specified	MN	
Note 'b': The terms 'containing chromium' and 'free of chromium' are descriptive, and not related to hazardous property assessment. Knowledge of the chromium in the waste is needed only to determine which non-hazardous entry is appropriate.			
04 02	**wastes from the textile industry**		
04 02 09	wastes from composite materials (impregnated textile, elastomer, plastomer)	AN	
04 02 10	organic matter from natural products (for example grease, wax)	AN	
04 02 14*	wastes from finishing containing organic solvents	MH	
04 02 15	wastes from finishing other than those mentioned in 04 02 14	MN	
04 02 16*	dyestuffs and pigments containing hazardous substances	MH	
04 02 17	dyestuffs and pigments other than those mentioned in 04 02 16	MN	
04 02 19*	sludges from on-site effluent treatment containing hazardous substances	MH	
04 02 20	sludges from on-site effluent treatment other than those mentioned in 04 02 19	MN	
04 02 21	wastes from unprocessed textile fibres	AN	
04 02 22	wastes from processed textile fibres	AN	
04 02 99	wastes not otherwise specified	AN	

Code	Description	Entry Type	Example provided
05	**WASTES FROM PETROLEUM REFINING, NATURAL GAS PURIFICATION AND PYROLYTIC TREATMENT OF COAL**		
05 01	**wastes from petroleum refining**		
05 01 02*	desalter sludges	AH	
05 01 03*	tank bottom sludges	AH	
05 01 04*	acid alkyl sludges	AH	
05 01 05*	oil spills	AH	
05 01 06*	oily sludges from maintenance operations of the plant or equipment	AH	
05 01 07*	acid tars	AH	
05 01 08*	other tars	AH	
05 01 09*	sludges from on-site effluent treatment containing hazardous substances	MH	
05 01 10	sludges from on-site effluent treatment other than those mentioned in 05 01 09	MN	
05 01 11*	wastes from cleaning of fuels with bases	AH	
05 01 12*	oil containing acids	AH	
05 01 13	boiler feedwater sludges	AN	
05 01 14	wastes from cooling columns	AN	
05 01 15*	spent filter clays	AH	
05 01 16	sulphur-containing wastes from petroleum desulphurisation	AN	
05 01 17	Bitumen	AN	
05 01 99	wastes not otherwise specified	AN	
05 06	**wastes from the pyrolytic treatment of coal**		
05 06 01*	acid tars	AH	
05 06 03*	other tars	AH	
05 06 04	waste from cooling columns	AN	
05 06 99	wastes not otherwise specified	AN	
05 07	**wastes from natural gas purification and transportation**		
05 07 01*	wastes containing mercury	MH	
05 07 02	wastes containing sulphur	AN	
05 07 99	wastes not otherwise specified	MN	
06	**WASTES FROM INORGANIC CHEMICAL PROCESSES**		
06 01	**wastes from the manufacture, formulation, supply and use (MFSU) of acids**		
06 01 01*	sulphuric acid and sulphurous acid	AH	
06 01 02*	hydrochloric acid	AH	
06 01 03*	hydrofluoric acid	AH	
06 01 04*	phosphoric and phosphorous acid	AH	
06 01 05*	nitric acid and nitrous acid	AH	
06 01 06*	other acids	AH	

Code	Description	Entry Type	Example provided
06 01 99	wastes not otherwise specified	AN	
06 02	**wastes from the MFSU of bases**		
06 02 01*	calcium hydroxide	AH	
06 02 03*	ammonium hydroxide	AH	
06 02 04*	sodium and potassium hydroxide	AH	
06 02 05*	other bases	AH	
06 02 99	wastes not otherwise specified	AN	
06 03	**wastes from the MFSU of salts and their solutions and metallic oxides**		
06 03 11*	solid salts and solutions containing cyanides	MH	
06 03 13*	solid salts and solutions containing heavy metals	MH	
06 03 14	solid salts and solutions other than those mentioned in 06 03 11 and 06 03 13	MN	
06 03 15*	metallic oxides containing heavy metals	MH	
06 03 16	metallic oxides other than those mentioned in 06 03 15	MN	
06 03 99	wastes not otherwise specified	AN	
06 04	**metal-containing wastes other than those mentioned in 06 03**		
06 04 03*	wastes containing arsenic	MH	
06 04 04*	wastes containing mercury	MH	
06 04 05*	wastes containing other heavy metals	MH	
06 04 99	wastes not otherwise specified	MN	
06 05	**sludges from on-site effluent treatment**		
06 05 02*	sludges from on-site effluent treatment containing hazardous substances	MH	
06 05 03	sludges from on-site effluent treatment other than those mentioned in 06 05 02	MN	
06 06	**wastes from the MFSU of sulphur chemicals, sulphur chemical processes and desulphurisation processes**		
06 06 02*	wastes containing hazardous sulphides	MH	
06 06 03	wastes containing sulphides other than those mentioned in 06 06 02	MN	
06 06 99	wastes not otherwise specified	AN	
06 07	**wastes from the MFSU of halogens and halogen chemical processes**		
06 07 01*	wastes containing asbestos from electrolysis	MH	
06 07 02*	activated carbon from chlorine production	AH	
06 07 03*	barium sulphate sludge containing mercury	MH	
06 07 04*	solutions and acids, for example contact acid	AH	
06 07 99	wastes not otherwise specified	MN	

Code	Description	Entry Type	Example provided
06 08	**wastes from the MFSU of silicon and silicon derivatives**		
06 08 02*	wastes containing hazardous chlorosilanes	MH	
06 08 99	wastes not otherwise specified	MN	
06 09	**wastes from the MSFU of phosphorous chemicals and phosphorous chemical processes**		
06 09 02	phosphorous slag	AN	
06 09 03*	calcium-based reaction wastes containing or contaminated with hazardous substances	MH	
06 09 04	calcium-based reaction wastes other than those mentioned in 06 09 03	MN	
06 09 99	wastes not otherwise specified	AN	
06 10	**wastes from the MFSU of nitrogen chemicals, nitrogen chemical processes and fertiliser manufacture**		
06 10 02*	wastes containing hazardous substances	MH	
06 10 99	wastes not otherwise specified	MN	
06 11	**wastes from the manufacture of inorganic pigments and opacificiers**		
06 11 01	calcium-based reaction wastes from titanium dioxide production	AN	
06 11 99	wastes not otherwise specified	AN	
06 13	**wastes from inorganic chemical processes not otherwise specified**		
06 13 01*	inorganic plant protection products, wood-preserving agents and other biocides.	AH	
06 13 02*	spent activated carbon (except 06 07 02)	AH	
06 13 03	carbon black	AN	
06 13 04*	wastes from asbestos processing	AH	
06 13 05*	Soot	AH	
06 13 99	wastes not otherwise specified	AN	
07	**WASTES FROM ORGANIC CHEMICAL PROCESSES**		
07 01	**wastes from the manufacture, formulation, supply and use (MFSU) of basic organic chemicals**		
07 01 01*	aqueous washing liquids and mother liquors	AH	2
07 01 03*	organic halogenated solvents, washing liquids and mother liquors	AH	
07 01 04*	other organic solvents, washing liquids and mother liquors	AH	
07 01 07*	halogenated still bottoms and reaction residues	AH	
07 01 08*	other still bottoms and reaction residues	AH	
07 01 09*	halogenated filter cakes and spent absorbents	AH	
07 01 10*	other filter cakes and spent absorbents	AH	
07 01 11*	sludges from on-site effluent treatment containing hazardous substances	MH	
07 01 12	sludges from on-site effluent treatment other than those mentioned in 07 01 11	MN	

Code	Description	Entry Type	Example provided
07 01 99	wastes not otherwise specified	AN	
07 02	**wastes from the MFSU of plastics, synthetic rubber and man-made fibres**		
07 02 01*	aqueous washing liquids and mother liquors	AH	2
07 02 03*	organic halogenated solvents, washing liquids and mother liquors	AH	
07 02 04*	other organic solvents, washing liquids and mother liquors	AH	
07 02 07*	halogenated still bottoms and reaction residues	AH	
07 02 08*	other still bottoms and reaction residues	AH	
07 02 09*	halogenated filter cakes and spent absorbents	AH	
07 02 10*	other filter cakes and spent absorbents	AH	
07 02 11*	sludges from on-site effluent treatment containing hazardous substances	MH	
07 02 12	sludges from on-site effluent treatment other than those mentioned in 07 02 11	MN	
07 02 13	waste plastic	AN	
07 02 14*	wastes from additives containing hazardous substances	MH	
07 02 15	wastes from additives other than those mentioned in 07 02 14	MN	
07 02 16*	wastes containing hazardous silicones	MH	
07 02 17	wastes containing silicones other than those mentioned in 07 02 16	MN	
07 02 99	wastes not otherwise specified	AN	
07 03	**wastes from the MFSU of organic dyes and pigments (except 06 11)**		
07 03 01*	aqueous washing liquids and mother liquors	AH	2
07 03 03*	organic halogenated solvents, washing liquids and mother liquors	AH	
07 03 04*	other organic solvents, washing liquids and mother liquors	AH	
07 03 07*	halogenated still bottoms and reaction residues	AH	
07 03 08*	other still bottoms and reaction residues	AH	
07 03 09*	halogenated filter cakes and spent absorbents	AH	
07 03 10*	other filter cakes and spent absorbents	AH	
07 03 11*	sludges from on-site effluent treatment containing hazardous substances	MH	
07 03 12	sludges from on-site effluent treatment other than those mentioned in 07 03 11	MN	
07 03 99	wastes not otherwise specified	AN	
07 04	**wastes from the MFSU of organic plant protection products (except 02 01 08 and 02 01 09), wood preserving agents (except 03 02) and other biocides**		
07 04 01*	aqueous washing liquids and mother liquors	AH	2
07 04 03*	organic halogenated solvents, washing liquids and mother liquors	AH	
07 04 04*	other organic solvents, washing liquids and mother liquors	AH	
07 04 07*	halogenated still bottoms and reaction residues	AH	
07 04 08*	other still bottoms and reaction residues	AH	
07 04 09*	halogenated filter cakes and spent absorbents	AH	

Code	Description	Entry Type	Example provided
07 04 10*	other filter cakes and spent absorbents	AH	
07 04 11*	sludges from on-site effluent treatment containing hazardous substances	MH	
07 04 12	sludges from on-site effluent treatment other than those mentioned in 07 04 11	MN	
07 04 13*	solid wastes containing hazardous substances	MH	
07 04 99	wastes not otherwise specified	MN	
07 05	**wastes from the MFSU of pharmaceuticals**		
07 05 01*	aqueous washing liquids and mother liquors	AH	2
07 05 03*	organic halogenated solvents, washing liquids and mother liquors	AH	
07 05 04*	other organic solvents, washing liquids and mother liquors	AH	
07 05 07*	halogenated still bottoms and reaction residues	AH	
07 05 08*	other still bottoms and reaction residues	AH	
07 05 09*	halogenated filter cakes and spent absorbents	AH	
07 05 10*	other filter cakes and spent absorbents	AH	
07 05 11*	sludges from on-site effluent treatment containing hazardous substances	MH	
07 05 12	sludges from on-site effluent treatment other than those mentioned in 07 05 11	MN	
07 05 13*	solid wastes containing hazardous substances	MH	c
07 05 14	solid wastes other than those mentioned in 07 05 13	MN	c
07 05 99	wastes not otherwise specified	AN	c
Note 'c': Waste medicinal products from manufacture or supply should be classified under the medicine codes in chapter 18.			
07 06	**wastes from the MFSU of fats, grease, soaps, detergents, disinfectants and cosmetics**		
07 06 01*	aqueous washing liquids and mother liquors	AH	2
07 06 03*	organic halogenated solvents, washing liquids and mother liquors	AH	
07 06 04*	other organic solvents, washing liquids and mother liquors	AH	
07 06 07*	halogenated still bottoms and reaction residues	AH	
07 06 08*	other still bottoms and reaction residues	AH	
07 06 09*	halogenated filter cakes and spent absorbents	AH	
07 06 10*	other filter cakes and spent absorbents	AH	
07 06 11*	sludges from on-site effluent treatment containing hazardous substances	MH	
07 06 12	sludges from on-site effluent treatment other than those mentioned in 07 06 11	MN	
07 06 99	wastes not otherwise specified	AN	
07 07	**wastes from the MFSU of fine chemicals and chemical products not otherwise specified**		
07 07 01*	aqueous washing liquids and mother liquors	AH	2
07 07 03*	organic halogenated solvents, washing liquids and mother liquors	AH	
07 07 04*	other organic solvents, washing liquids and mother liquors	AH	
07 07 07*	halogenated still bottoms and reaction residues	AH	

Code	Description	Entry Type	Example provided
07 07 08*	other still bottoms and reaction residues	AH	
07 07 09*	halogenated filter cakes and spent absorbents	AH	
07 07 10*	other filter cakes and spent absorbents	AH	
07 07 11*	sludges from on-site effluent treatment containing hazardous substances	MH	
07 07 12	sludges from on-site effluent treatment other than those mentioned in 07 07 11	MN	
07 07 99	wastes not otherwise specified	AN	
08	**WASTES FROM THE MANUFACTURE, FORMULATION, SUPPLY AND USE (MFSU) OF COATINGS (PAINTS, VARNISHES AND VITREOUS ENAMELS), ADHESIVES, SEALANTS AND PRINTING INKS**		
08 01	**wastes from MFSU and removal of paint and varnish**		
08 01 11*	waste paint and varnish containing organic solvents or other hazardous substances	MH	
08 01 12	waste paint and varnish other than those mentioned in 08 01 11	MN	
08 01 13*	sludges from paint or varnish containing organic solvents or other hazardous substances	MH	
08 01 14	sludges from paint or varnish other than those mentioned in 08 01 13	MN	
08 01 15*	aqueous sludges containing paint or varnish containing organic solvents or other hazardous substances	MH	
08 01 16	aqueous sludges containing paint or varnish other than those mentioned in 08 01 15	MN	
08 01 17*	wastes from paint or varnish removal containing organic solvents or other hazardous substances	MH	
08 01 18	wastes from paint or varnish removal other than those mentioned in 08 01 17	MN	
08 01 19*	aqueous suspensions containing paint or varnish containing organic solvents or other hazardous substances	MH	
08 01 20	aqueous suspensions containing paint or varnish other than those mentioned in 08 01 19	MN	
08 01 21*	waste paint or varnish remover	AH	
08 01 99	wastes not otherwise specified	AN	
08 02	**wastes from MFSU of other coatings (including ceramic materials)**		
08 02 01	waste coating powders	AN	
08 02 02	aqueous sludges containing ceramic materials	AN	d
08 02 03	aqueous suspensions containing ceramic materials	AN	d
08 02 99	wastes not otherwise specified	AN	
Note 'd': The term 'containing ceramic materials' is descriptive, and not related to hazardous property assessment. Knowledge of the ceramic materials in the waste is needed only to determine which non-hazardous entry is appropriate.			

Code	Description	Entry Type	Example provided
08 03	**wastes from MFSU of printing inks**		
08 03 07	aqueous sludges containing ink	AN	
08 03 08	aqueous liquid waste containing ink	AN	
08 03 12*	waste ink containing hazardous substances	MH	
08 03 13	waste ink other than those mentioned in 08 03 12	MN	
08 03 14*	ink sludges containing hazardous substances	MH	
08 03 15	ink sludges other than those mentioned in 08 03 14	MN	
08 03 16*	waste etching solutions	AH	
08 03 17*	waste printing toner containing hazardous substances	MH	
08 03 18	waste printing toner other than those mentioned in 08 03 17	MN	
08 03 19*	disperse oil	AH	
08 03 99	wastes not otherwise specified	AN	
08 04	**wastes from MFSU of adhesives and sealants (including waterproofing products)**		
08 04 09*	waste adhesives and sealants containing organic solvents or other hazardous substances	MH	
08 04 10	waste adhesives and sealants other than those mentioned in 08 04 09	MN	
08 04 11*	adhesive and sealant sludges containing organic solvents or other hazardous substances	MH	
08 04 12	adhesive and sealant sludges other than those mentioned in 08 04 11	MN	
08 04 13*	aqueous sludges containing adhesives or sealants containing organic solvents or other hazardous substances	MH	
08 04 14	aqueous sludges containing adhesives or sealants other than those mentioned in 08 04 13	MN	
08 04 15*	aqueous liquid waste containing adhesives or sealants containing organic solvents or other hazardous substances	MH	
08 04 16	aqueous liquid waste containing adhesives or sealants other than those mentioned in 08 04 15	MN	
08 04 17*	rosin oil	AH	
08 04 99	wastes not otherwise specified	AN	
08 05	**wastes not otherwise specified in 08**		
08 05 01*	waste isocyanates	AH	
09	**WASTES FROM THE PHOTOGRAPHIC INDUSTRY**		
09 01	**wastes from the photographic industry**		
09 01 01*	water-based developer and activator solutions	AH	
09 01 02*	water-based offset plate developer solutions	AH	
09 01 03*	solvent-based developer solutions	AH	
09 01 04*	fixer solutions	AH	
09 01 05*	bleach solutions and bleach fixer solutions	AH	
09 01 06*	wastes containing silver from on-site treatment of photographic wastes	MH	e,2
09 01 07	photographic film and paper containing silver or silver compounds	AN	e

Code	Description	Entry Type	Example provided
09 01 08	photographic film and paper free of silver or silver compounds	AN	e
09 01 10	single-use cameras without batteries	AN	
09 01 11*	single-use cameras containing batteries included in 16 06 01, 16 06 02 or 16 06 03	AH	6
09 01 12	single-use cameras containing batteries other than those mentioned in 09 01 11	AN	6
09 01 13*	aqueous liquid waste from on-site reclamation of silver other than those mentioned in 09 01 06	AH	e,2
09 01 99	wastes not otherwise specified	MN	e,2
Note 'e': All aqueous liquid waste from on site-reclamation of silver is hazardous waste under 09 01 06* (if it contains silver) or 09 01 13* (if it does not). Note: The terms 'containing' or 'free of' referring to 'silver or silver compounds' is descriptive, and not related to hazardous property assessment. Knowledge of the silver in the waste is needed only to determine which non-hazardous entry is appropriate.			
10	**WASTES FROM THERMAL PROCESSES**		
10 01	**wastes from power stations and other combustion plants (except 19)**		
10 01 01	bottom ash, slag and boiler dust (excluding boiler dust mentioned in 10 01 04)	AN	
10 01 02	coal fly ash	AN	
10 01 03	fly ash from peat and untreated wood	AN	
10 01 04*	oil fly ash and boiler dust	AH	
10 01 05	calcium-based reaction wastes from flue-gas desulphurisation in solid form	AN	
10 01 07	calcium-based reaction wastes from flue-gas desulphurisation in sludge form	AN	
10 01 09*	sulphuric acid	AH	
10 01 13*	fly ash from emulsified hydrocarbons used as fuel	AH	
10 01 14*	bottom ash, slag and boiler dust from co-incineration containing hazardous substances	MH	
10 01 15	bottom ash, slag and boiler dust from co-incineration other than those mentioned in 10 01 14	MN	
10 01 16*	fly ash from co-incineration containing hazardous substances	MH	
10 01 17	fly ash from co-incineration other than those mentioned in 10 01 16	MN	
10 01 18*	wastes from gas cleaning containing hazardous substances	MH	
10 01 19	wastes from gas cleaning other than those mentioned in 10 01 05, 10 01 07 and 10 01 18	MN	
10 01 20*	sludges from on-site effluent treatment containing hazardous substances	MH	
10 01 21	sludges from on-site effluent treatment other than those mentioned in 10 01 20	MN	
10 01 22*	aqueous sludges from boiler cleansing containing hazardous substances	MH	
10 01 23	aqueous sludges from boiler cleansing other than those mentioned in 10 01 22	MN	
10 01 24	sands from fluidised beds	AN	

Code	Description	Entry Type	Example provided
10 01 25	wastes from fuel storage and preparation of coal-fired power plants	AN	
10 01 26	wastes from cooling-water treatment	AN	
10 01 99	wastes not otherwise specified	AN	
10 02	**wastes from the iron and steel industry**		
10 02 01	wastes from the processing of slag	AN	
10 02 02	unprocessed slag	AN	
10 02 07*	solid wastes from gas treatment containing hazardous substances	MH	
10 02 08	solid wastes from gas treatment other than those mentioned in 10 02 07	MN	
10 02 10	mill scales	AN	
10 02 11*	wastes from cooling-water treatment containing oil	MH	
10 02 12	wastes from cooling-water treatment other than those mentioned in 10 02 11	MN	
10 02 13*	sludges and filter cakes from gas treatment containing hazardous substances	MH	
10 02 14	sludges and filter cakes from gas treatment other than those mentioned in 10 02 13	MN	
10 02 15	other sludges and filter cakes	MN	
10 02 99	wastes not otherwise specified	AN	
10 03	**wastes from aluminium thermal metallurgy**		
10 03 02	anode scraps	AN	
10 03 04*	primary production slags	AH	
10 03 05	waste alumina	AN	
10 03 08*	salt slags from secondary production	AH	
10 03 09*	black drosses from secondary production	AH	
10 03 15*	skimmings that are flammable or emit, upon contact with water, flammable gases in hazardous quantities	MH	f
10 03 16	skimmings other than those mentioned in 10 03 15	MN	f
10 03 17*	tar-containing wastes from anode manufacture	AH	
10 03 18	carbon-containing wastes from anode manufacture other than those mentioned in 10 03 17	AN	
10 03 19*	flue-gas dust containing hazardous substances	MH	
10 03 20	flue-gas dust other than those mentioned in 10 03 19	MN	
10 03 21*	other particulates and dust (including ball-mill dust) containing hazardous substances	MH	
10 03 22	other particulates and dust (including ball-mill dust) other than those mentioned in 10 03 21	MN	
10 03 23*	solid wastes from gas treatment containing hazardous substances	MH	
10 03 24	solid wastes from gas treatment other than those mentioned in 10 03 23	MN	
10 03 25*	sludges and filter cakes from gas treatment containing hazardous substances	MH	
10 03 26	sludges and filter cakes from gas treatment other than those mentioned in 10 03 25	MN	
10 03 27*	wastes from cooling-water treatment containing oil	MH	

Code	Description	Entry Type	Example provided
10 03 28	wastes from cooling-water treatment other than those mentioned in 10 03 27	MN	
10 03 29*	wastes from treatment of salt slags and black drosses containing hazardous substances	MH	
10 03 30	wastes from treatment of salt slags and black drosses other than those mentioned in 10 03 29	MN	
10 03 99	wastes not otherwise specified	AN	
Note 'f': 10 03 15* and 10 03 16 are assigned on the basis of the waste displaying hazardous property HP 3 Flammable or containing POPs.			
10 04	**wastes from lead thermal metallurgy**		
10 04 01*	slags from primary and secondary production	AH	
10 04 02*	dross and skimmings from primary and secondary production	AH	
10 04 03*	calcium arsenate	AH	
10 04 04*	flue-gas dust	AH	
10 04 05*	other particulates and dust	AH	
10 04 06*	solid wastes from gas treatment	AH	
10 04 07*	sludges and filter cakes from gas treatment	AH	
10 04 09*	wastes from cooling-water treatment containing oil	MH	
10 04 10	wastes from cooling-water treatment other than those mentioned in 10 04 09	MN	
10 04 99	wastes not otherwise specified	AN	
10 05	**wastes from zinc thermal metallurgy**		
10 05 01	slags from primary and secondary production	AN	
10 05 03*	flue-gas dust	AH	
10 05 04	other particulates and dust	AN	
10 05 05*	solid waste from gas treatment	AH	
10 05 06*	sludges and filter cakes from gas treatment	AH	
10 05 08*	wastes from cooling-water treatment containing oil	MH	
10 05 09	wastes from cooling-water treatment other than those mentioned in 10 05 08	MN	
10 05 10*	dross and skimmings that are flammable or emit, upon contact with water, flammable gases in hazardous quantities	MH	g
10 05 11	dross and skimmings other than those mentioned in 10 05 10	MN	g
10 05 99	wastes not otherwise specified	AN	
Note 'g': 10 05 10* and 10 05 11 are assigned on the basis of the waste displaying hazardous property HP 3 Flammable or containing POPs.			
10 06	**wastes from copper thermal metallurgy**		
10 06 01	slags from primary and secondary production	AN	
10 06 02	dross and skimmings from primary and secondary production	AN	
10 06 03*	flue-gas dust	AH	
10 06 04	other particulates and dust	AN	
10 06 06*	solid wastes from gas treatment	AH	
10 06 07*	sludges and filter cakes from gas treatment	AH	
10 06 09*	wastes from cooling-water treatment containing oil	MH	

Code	Description	Entry Type	Example provided
10 06 10	wastes from cooling-water treatment other than those mentioned in 10 06 09	MN	
10 06 99	wastes not otherwise specified	AN	
10 07	**wastes from silver, gold and platinum thermal metallurgy**		
10 07 01	slags from primary and secondary production	AN	
10 07 02	dross and skimmings from primary and secondary production	AN	
10 07 03	solid wastes from gas treatment	AN	
10 07 04	other particulates and dust	AN	
10 07 05	sludges and filter cakes from gas treatment	AN	
10 07 07*	wastes from cooling-water treatment containing oil	MH	
10 07 08	wastes from cooling-water treatment other than those mentioned in 10 07 07	MN	
10 07 99	wastes not otherwise specified	AN	
10 08	**wastes from other non-ferrous thermal metallurgy**		
10 08 04	particulates and dust	AN	
10 08 08*	salt slag from primary and secondary production	AH	
10 08 09	other slags	AN	
10 08 10*	dross and skimmings that are flammable or emit, upon contact with water, flammable gases in hazardous quantities	MH	h
10 08 11	dross and skimmings other than those mentioned in 10 08 10	MN	h
10 08 12*	tar-containing wastes from anode manufacture	AH	
10 08 13	carbon-containing wastes from anode manufacture other than those mentioned in 10 08 12	AN	
10 08 14	anode scrap	AN	
10 08 15*	flue-gas dust containing hazardous substances	MH	
10 08 16	flue-gas dust other than those mentioned in 10 08 15	MN	
10 08 17*	sludges and filter cakes from flue-gas treatment containing hazardous substances	MH	
10 08 18	sludges and filter cakes from flue-gas treatment other than those mentioned in 10 08 17	MN	
10 08 19*	wastes from cooling-water treatment containing oil	MH	
10 08 20	wastes from cooling-water treatment other than those mentioned in 10 08 19	MN	
10 08 99	wastes not otherwise specified	AN	
Note 'h': 10 08 10* and 10 08 11 are assigned on the basis of the waste displaying hazardous property HP 3 Flammable or containing POPs.			
10 09	**wastes from casting of ferrous pieces**		
10 09 03	furnace slag	AN	
10 09 05*	casting cores and moulds which have not undergone pouring containing hazardous substances	MH	
10 09 06	casting cores and moulds which have not undergone pouring other than those mentioned in 10 09 05	MN	
10 09 07*	casting cores and moulds which have undergone pouring containing hazardous substances	MH	

Code	Description	Entry Type	Example provided
10 09 08	casting cores and moulds which have undergone pouring other than those mentioned in 10 09 07	MN	
10 09 09*	flue-gas dust containing hazardous substances	MH	
10 09 10	flue-gas dust other than those mentioned in 10 09 09	MN	
10 09 11*	other particulates containing hazardous substances	MH	
10 09 12	other particulates other than those mentioned in 10 09 11	MN	
10 09 13*	waste binders containing hazardous substances	MH	
10 09 14	waste binders other than those mentioned in 10 09 13	MN	
10 09 15*	waste crack-indicating agent containing hazardous substances	MH	
10 09 16	waste crack-indicating agent other than those mentioned in 10 09 15	MN	
10 09 99	wastes not otherwise specified	AN	
10 10	**wastes from casting of non-ferrous pieces**		
10 10 03	furnace slag	AN	
10 10 05*	casting cores and moulds which have not undergone pouring, containing hazardous substances	MH	
10 10 06	casting cores and moulds which have not undergone pouring, other than those mentioned in 10 10 05	MN	
10 10 07*	casting cores and moulds which have undergone pouring, containing hazardous substances	MH	
10 10 08	casting cores and moulds which have undergone pouring, other than those mentioned in 10 10 07	MN	
10 10 09*	flue-gas dust containing hazardous substances	MH	
10 10 10	flue-gas dust other than those mentioned in 10 10 09	MN	
10 10 11*	other particulates containing hazardous substances	MH	
10 10 12	other particulates other than those mentioned in 10 10 11	MN	
10 10 13*	waste binders containing hazardous substances	MH	
10 10 14	waste binders other than those mentioned in 10 10 13	MN	
10 10 15*	waste crack-indicating agent containing hazardous substances	MH	
10 10 16	waste crack-indicating agent other than those mentioned in 10 10 15	MN	
10 10 99	wastes not otherwise specified	AN	
10 11	**wastes from manufacture of glass and glass products**		
10 11 03	waste glass-based fibrous materials	AN	
10 11 05	particulates and dust	AN	
10 11 09*	waste preparation mixture before thermal processing, containing hazardous substances	MH	
10 11 10	waste preparation mixture before thermal processing, other than those mentioned in 10 11 09	MN	
10 11 11*	waste glass in small particles and glass powder containing heavy metals (for example from cathode ray tubes)	MH	
10 11 12	waste glass other than those mentioned in 10 11 11	MN	
10 11 13*	glass-polishing and -grinding sludge containing hazardous substances	MH	

Code	Description	Entry Type	Example provided
10 11 14	glass-polishing and -grinding sludge other than those mentioned in 10 11 13	MN	
10 11 15*	solid wastes from flue-gas treatment containing hazardous substances	MH	
10 11 16	solid wastes from flue-gas treatment other than those mentioned in 10 11 15	MN	
10 11 17*	sludges and filter cakes from flue-gas treatment containing hazardous substances	MH	
10 11 18	sludges and filter cakes from flue-gas treatment other than those mentioned in 10 11 17	MN	
10 11 19*	solid wastes from on-site effluent treatment containing hazardous substances	MH	
10 11 20	solid wastes from on-site effluent treatment other than those mentioned in 10 11 19	MN	
10 11 99	wastes not otherwise specified	AN	
10 12	**wastes from manufacture of ceramic goods, bricks, tiles and construction products**		
10 12 01	waste preparation mixture before thermal processing	AN	
10 12 03	particulates and dust	AN	
10 12 05	sludges and filter cakes from gas treatment	AN	
10 12 06	discarded moulds	AN	
10 12 08	waste ceramics, bricks, tiles and construction products (after thermal processing)	AN	
10 12 09*	solid wastes from gas treatment containing hazardous substances	MH	
10 12 10	solid wastes from gas treatment other than those mentioned in 10 12 09	MN	
10 12 11*	wastes from glazing containing heavy metals	MH	
10 12 12	wastes from glazing other than those mentioned in 10 12 11	MN	
10 12 13	sludge from on-site effluent treatment	AN	
10 12 99	wastes not otherwise specified	AN	
10 13	**wastes from manufacture of cement, lime and plaster and articles and products made from them**		
10 13 01	waste preparation mixture before thermal processing	AN	
10 13 04	wastes from calcination and hydration of lime	AN	
10 13 06	particulates and dust (except 10 13 12 and 10 13 13)	MN	
10 13 07	sludges and filter cakes from gas treatment	AN	
10 13 09*	wastes from asbestos-cement manufacture containing asbestos	MH	
10 13 10	wastes from asbestos-cement manufacture other than those mentioned in 10 13 09	MN	
10 13 11	wastes from cement-based composite materials other than those mentioned in 10 13 09 and 10 13 10	MN	
10 13 12*	solid wastes from gas treatment containing hazardous substances	MH	
10 13 13	solid wastes from gas treatment other than those mentioned in 10 13 12	MN	
10 13 14	waste concrete and concrete sludge	AN	

Code	Description	Entry Type	Example provided
10 13 99	wastes not otherwise specified	AN	
10 14	**waste from crematoria**		
10 14 01*	waste from gas cleaning containing mercury	MH	i
Note 'i': This entry is part of a mirror entry with 10 01 18* and 10 01 19. All hazardous substances need to be assessed to identify the correct mirror code.			
11	**WASTES FROM CHEMICAL SURFACE TREATMENT AND COATING OF METALS AND OTHER MATERIALS; NON-FERROUS HYDRO-METALLURGY**		
11 01	**wastes from chemical surface treatment and coating of metals and other materials (for example galvanic processes, zinc coating processes, pickling processes, etching, phosphating, alkaline degreasing, anodising)**		
11 01 05*	pickling acids	AH	
11 01 06*	acids not otherwise specified	AH	
11 01 07*	pickling bases	AH	
11 01 08*	phosphatising sludges	AH	
11 01 09*	sludges and filter cakes containing hazardous substances	MH	
11 01 10	sludges and filter cakes other than those mentioned in 11 01 09	MN	
11 01 11*	aqueous rinsing liquids containing hazardous substances	MH	
11 01 12	aqueous rinsing liquids other than those mentioned in 11 01 11	MN	
11 01 13*	degreasing wastes containing hazardous substances	MH	
11 01 14	degreasing wastes other than those mentioned in 11 01 13	MN	
11 01 15*	eluate and sludges from membrane systems or ion exchange systems containing hazardous substances	MH	
11 01 16*	saturated or spent ion exchange resins	AH	
11 01 98*	other wastes containing hazardous substances	MH	
11 01 99	wastes not otherwise specified	MN	
11 02	**wastes from non-ferrous hydrometallurgical processes**		
11 02 02*	sludges from zinc hydrometallurgy (including jarosite, goethite)	AH	
11 02 03	wastes from the production of anodes for aqueous electrolytical processes	AN	
11 02 05*	wastes from copper hydrometallurgical processes containing hazardous substances	MH	
11 02 06	wastes from copper hydrometallurgical processes other than those mentioned in 11 02 05	MN	
11 02 07*	other wastes containing hazardous substances	MH	
11 02 99	wastes not otherwise specified	MN	
11 03	**sludges and solids from tempering processes**		
11 03 01*	wastes containing cyanide	AH	j
11 03 02*	other waste	AH	j

Code	Description	Entry Type	Example provided
Note 'j' Sludges and solids from tempering processes are always hazardous. 11 03 01* is assigned if the waste displays a hazardous property due to the presence of cyanide.			
11 05	**wastes from hot galvanising processes**		
11 05 01	hard zinc	AN	
11 05 02	zinc ash	AN	
11 05 03*	solid wastes from gas treatment	AH	
11 05 04*	spent flux	AH	
11 05 99	wastes not otherwise specified	AN	
12	**WASTES FROM SHAPING AND PHYSICAL AND MECHANICAL SURFACE TREATMENT OF METALS AND PLASTICS**		
12 01	**wastes from shaping and physical and mechanical surface treatment of metals and plastics**		
12 01 01	ferrous metal filings and turnings	AN	
12 01 02	ferrous metal dust and particles	AN	
12 01 03	non-ferrous metal filings and turnings	AN	
12 01 04	non-ferrous metal dust and particles	AN	
12 01 05	plastics shavings and turnings	AN	
12 01 06*	mineral-based machining oils containing halogens (except emulsions and solutions)	AH	k
12 01 07*	mineral-based machining oils free of halogens (except emulsions and solutions)	AH	k
12 01 08*	machining emulsions and solutions containing halogens	AH	
12 01 09*	machining emulsions and solutions free of halogens	AH	
12 01 10*	synthetic machining oils	AH	
12 01 12*	spent waxes and fats	AH	
12 01 13	welding wastes	AN	
12 01 14*	machining sludges containing hazardous substances	MH	
12 01 15	machining sludges other than those mentioned in 12 01 14	MN	
12 01 16*	waste blasting material containing hazardous substances	MH	
12 01 17	waste blasting material other than those mentioned in 12 01 16	MN	
12 01 18*	metal sludge (grinding, honing and lapping sludge) containing oil	MH	
12 01 19*	readily biodegradable machining oil	AH	
12 01 20*	spent grinding bodies and grinding materials containing hazardous substances	MH	
12 01 21	spent grinding bodies and grinding materials other than those mentioned in 12 01 20	MN	
12 01 99	wastes not otherwise specified	MN	
Note 'k': the term 'containing' or 'free of' referring to halogens are descriptive, relating to the type of oil, and not related to the assessment of hazardous properties. Knowledge of the halogen content of the waste is needed only to determine which hazardous entry is appropriate.			
12 03	**wastes from water and steam degreasing processes (except 11)**		
12 03 01*	aqueous washing liquids	AH	

Code	Description	Entry Type	Example provided
12 03 02*	steam degreasing wastes	AH	
13	**OIL WASTES AND WASTES OF LIQUID FUELS (except edible oils, and those in chapters 05, 12 and 19)**		
13 01	**waste hydraulic oils**		
13 01 01*	hydraulic oils, containing PCBs	AH	l
13 01 04*	chlorinated emulsions	AH	
13 01 05*	non-chlorinated emulsions	AH	
13 01 09*	mineral-based chlorinated hydraulic oils	AH	
13 01 10*	mineral based non-chlorinated hydraulic oils	AH	
13 01 11*	synthetic hydraulic oils	AH	
13 01 12*	readily biodegradable hydraulic oils	AH	
13 01 13*	other hydraulic oils	AH	
Note 'l': 13 01 01* is used when PCBs are present in any hydraulic oil at a concentration of equal to or greater than 50 mg/kg (0.005%).			
13 02	**waste engine, gear and lubricating oils**		
13 02 04*	mineral-based chlorinated engine, gear and lubricating oils	AH	
13 02 05*	mineral-based non-chlorinated engine, gear and lubricating oils	AH	
13 02 06*	synthetic engine, gear and lubricating oils	AH	
13 02 07*	readily biodegradable engine, gear and lubricating oils	AH	
13 02 08*	other engine, gear and lubricating oils	AH	
13 03	**waste insulating and heat transmission oils**		
13 03 01*	insulating or heat transmission oils containing PCBs	AH	m
13 03 06*	mineral-based chlorinated insulating and heat transmission oils other than those mentioned in 13 03 01	AH	
13 03 07*	mineral-based non-chlorinated insulating and heat transmission oils	AH	
13 03 08*	synthetic insulating and heat transmission oils	AH	
13 03 09*	readily biodegradable insulating and heat transmission oils	AH	
13 03 10*	other insulating and heat transmission oils	AH	
Note 'm': 13 03 01* is used when PCBs are present in any insulating or heat transmission oil at a concentration of equal to or greater than 50 mg/kg (0.005%).			
13 04	**bilge oils**		
13 04 01*	bilge oils from inland navigation	AH	
13 04 02*	bilge oils from jetty sewers	AH	
13 04 03*	bilge oils from other navigation	AH	
13 05	**oil/water separator contents**		
13 05 01*	solids from grit chambers and oil/water separators	AH	
13 05 02*	sludges from oil/water separators	AH	
13 05 03*	interceptor sludges	AH	
13 05 06*	oil from oil/water separators	AH	
13 05 07*	oily water from oil/water separators	AH	
13 05 08*	mixtures of wastes from grit chambers and oil/water separators	AH	

Code	Description	Entry Type	Example provided
13 07	**wastes of liquid fuels**		
13 07 01*	fuel oil and diesel	AH	
13 07 02*	petrol	AH	
13 07 03*	other fuels (including mixtures)	AH	
13 08	**oil wastes not otherwise specified**		
13 08 01*	desalter sludges or emulsions	AH	
13 08 02*	other emulsions	AH	
13 08 99*	wastes not otherwise specified	AH	
14	**WASTE ORGANIC SOLVENTS, REFRIGERANTS AND PROPELLANTS (except 07 and 08)**		
14 06	**waste organic solvents, refrigerants and foam/aerosol propellants**		
14 06 01*	chlorofluorocarbons, HCFC, HFC	AH	
14 06 02*	other halogenated solvents and solvent mixtures	AH	
14 06 03*	other solvents and solvent mixtures	AH	
14 06 04*	sludges or solid wastes containing halogenated solvents	MH	
14 06 05*	sludges or solid wastes containing other solvents	MH	
15	**WASTE PACKAGING, ABSORBENTS, WIPING CLOTHS, FILTER MATERIALS AND PROTECTIVE CLOTHING NOT OTHERWISE SPECIFIED**		
15 01	**packaging (including separately collected municipal packaging waste)**		
15 01 01	paper and cardboard packaging	AN	7
15 01 02	plastic packaging	AN	7
15 01 03	wooden packaging	AN	7
15 01 04	metallic packaging	AN	7
15 01 05	composite packaging	AN	7
15 01 06	mixed packaging	AN	7
15 01 07	glass packaging	AN	7
15 01 09	textile packaging	AN	7
15 01 10*	packaging containing residues of or contaminated by hazardous substances	AH	7
15 01 11*	metallic packaging containing a hazardous solid porous matrix (for example asbestos), including empty pressure containers	AH	7
15 02	**absorbents, filter materials, wiping cloths and protective clothing**		
15 02 02*	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by hazardous substances	MH	n
15 02 03	absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02	MN	n
Note 'n': when assessing the mirror entry, 'contaminated' has the same meaning as containing			

Code	Description	Entry Type	Example provided
16	**WASTES NOT OTHERWISE SPECIFIED IN THE LIST**		
16 01	**end-of-life vehicles from different means of transport (including off-road machinery) and wastes from dismantling of end-of-life vehicles and vehicle maintenance (except 13, 14, 16 06 and 16 08)**		
16 01 03	end-of-life tyres	AN	
16 01 04*	end-of-life vehicles	AH	3
16 01 06	end-of-life vehicles, containing neither liquids nor other hazardous components	AN	3
16 01 07*	oil filters	AH	
16 01 08*	components containing mercury	MH	
16 01 09*	components containing PCBs	MH	o
16 01 10*	explosive components (for example air bags)	AH	
16 01 11*	brake pads containing asbestos	MH	
16 01 12	brake pads other than those mentioned in 16 01 11	MN	
16 01 13*	brake fluids	AH	
16 01 14*	antifreeze fluids containing hazardous substances	MH	
16 01 15	antifreeze fluids other than those mentioned in 16 01 14	MN	
16 01 16	tanks for liquefied gas	AN	
16 01 17	ferrous metal	AN	
16 01 18	non-ferrous metal	AN	
16 01 19	plastic	AN	
16 01 20	glass	AN	
16 01 21*	hazardous components other than those mentioned in 16 01 07 to 16 01 11 and 16 01 13 and 16 01 14	AH	
16 01 22	components not otherwise specified	MN	
16 01 99	wastes not otherwise specified	AN	
Note ‘o’: 16 01 09* is used when PCBs are present in a component at a concentration of equal to or greater than 50 mg/kg (0.005%).			
16 02	**wastes from electrical and electronic equipment**		
16 02 09*	transformers and capacitors containing PCBs	AH	p,6
16 02 10*	discarded equipment containing or contaminated by PCBs other than those mentioned in 16 02 09	AH	p,6
16 02 11*	discarded equipment containing chlorofluorocarbons, HCFC, HFC	AH	6
16 02 12*	discarded equipment containing free asbestos	AH	6
16 02 13*	discarded equipment containing hazardous components other than those mentioned in 16 02 09 to 16 02 12	AH	6
16 02 14	discarded equipment other than those mentioned in 16 02 09 to 16 02 13	AN	6
16 02 15*	hazardous components removed from discarded equipment	AH	
16 02 16	components removed from discarded equipment other than those mentioned in 16 02 15	AN	
Note ‘p’: 16 02 09* and 16 02 10* are used when PCBs are present at a concentration of equal to or greater than 50 mg/kg (0.005%). If not, the other entries in this sub-chapter can be considered.			

Code	Description	Entry Type	Example provided
16 03	**off-specification batches and unused products**		
16 03 03*	inorganic wastes containing hazardous substances	MH	
16 03 04	inorganic wastes other than those mentioned in 16 03 03	MN	
16 03 05*	organic wastes containing hazardous substances	MH	
16 03 06	organic wastes other than those mentioned in 16 03 05	MN	
16 03 07*	metallic mercury	AH	
16 04	**waste explosives**		
16 04 01*	waste ammunition	AH	
16 04 02*	fireworks wastes	AH	
16 04 03*	other waste explosives	AH	
16 05	**gases in pressure containers and discarded chemicals**		
16 05 04*	gases in pressure containers (including halons) containing hazardous substances	MH	
16 05 05	gases in pressure containers other than those mentioned in 16 05 04	MN	
16 05 06*	laboratory chemicals, consisting of or containing hazardous substances, including mixtures of laboratory chemicals	MH	
16 05 07*	discarded inorganic chemicals consisting of or containing hazardous substances	MH	
16 05 08*	discarded organic chemicals consisting of or containing hazardous substances	MH	
16 05 09	discarded chemicals other than those mentioned in 16 05 06, 16 05 07 or 16 05 08	MN	
16 06	**batteries and accumulators**		
16 06 01*	lead batteries	AH	
16 06 02*	Ni-Cd batteries	AH	
16 06 03*	mercury-containing batteries	AH	
16 06 04	alkaline batteries (except 16 06 03)	AN	
16 06 05	other batteries and accumulators	AN	
16 06 06*	separately collected electrolyte from batteries and accumulators	AH	
16 07	**wastes from transport tank, storage tank and barrel cleaning (except 05 and 13)**		
16 07 08*	wastes containing oil	MH	
16 07 09*	wastes containing other hazardous substances	MH	
16 07 99	wastes not otherwise specified	MN	
16 08	**spent catalysts**		
16 08 01	spent catalysts containing gold, silver, rhenium, rhodium, palladium, iridium or platinum (except 16 08 07)	MN	
16 08 02*	spent catalysts containing hazardous transition metals or hazardous transition metal compounds	MH	
16 08 03	spent catalysts containing transition metals or transition metal compounds not otherwise specified	MN	
16 08 04	spent fluid catalytic cracking catalysts (except 16 08 07)	MN	

Code	Description	Entry Type	Example provided
16 08 05*	spent catalysts containing phosphoric acid	MH	
16 08 06*	spent liquids used as catalysts	AH	
16 08 07*	spent catalysts contaminated with hazardous substances	MH	
16 09	**oxidising substances**		
16 09 01*	permanganates, for example potassium permanganate	AH	
16 09 02*	chromates, for example potassium chromate, potassium or sodium dichromate	AH	
16 09 03*	peroxides, for example hydrogen peroxide	AH	
16 09 04*	oxidising substances, not otherwise specified	AH	
16 10	**aqueous liquid wastes destined for off-site treatment**		
16 10 01*	aqueous liquid wastes containing hazardous substances	MH	2
16 10 02	aqueous liquid wastes other than those mentioned in 16 10 01	MN	2
16 10 03*	aqueous concentrates containing hazardous substances	MH	2
16 10 04	aqueous concentrates other than those mentioned in 16 10 03	MN	2
16 11	**waste linings and refractories**		
16 11 01*	carbon-based linings and refractories from metallurgical processes containing hazardous substances	MH	
16 11 02	carbon-based linings and refractories from metallurgical processes other than those mentioned in 16 11 01	MN	
16 11 03*	other linings and refractories from metallurgical processes containing hazardous substances	MH	
16 11 04	other linings and refractories from metallurgical processes other than those mentioned in 16 11 03	MN	
16 11 05*	linings and refractories from non-metallurgical processes containing hazardous substances	MH	
16 11 06	linings and refractories from non-metallurgical processes other than those mentioned in 16 11 05	MN	
17	**CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)**		
17 01	**concrete, bricks, tiles and ceramics**		
17 01 01	concrete	MN	
17 01 02	bricks	MN	
17 01 03	tiles and ceramics	MN	
17 01 06*	mixtures of, or separate fractions of concrete, bricks, tiles and ceramics containing hazardous substances	MH	
17 01 07	mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06	MN	
17 02	**wood, glass and plastic**		
17 02 01	wood	MN	
17 02 02	glass	MN	
17 02 03	Plastic	MN	

Code	Description	Entry Type	Example provided
17 02 04*	glass, plastic and wood containing or contaminated with hazardous substances	MH	
17 03	**bituminous mixtures, coal tar and tarred products**		
17 03 01*	bituminous mixtures containing coal tar	MH	
17 03 02	bituminous mixtures other than those mentioned in 17 03 01	MN	
17 03 03*	coal tar and tarred products	AH	
17 04	**metals (including their alloys)**		
17 04 01	copper, bronze, brass	MN	
17 04 02	aluminium	MN	
17 04 03	lead	MN	
17 04 04	zinc	MN	
17 04 05	iron and steel	MN	
17 04 06	tin	MN	
17 04 07	mixed metals	MN	
17 04 09*	metal waste contaminated with hazardous substances	MH	'q'
17 04 10*	cables containing oil, coal tar and other hazardous substances	MH	
17 04 11	cables other than those mentioned in 17 04 10	MN	
Note 'q': The term 'metal waste contaminated with' indicates that the metal waste itself is not considered in the assessment. Hazardous substances in paints, coatings or other contamination are considered. Metal elements in alloys in massive form are generally excluded from assessment by the List of Wastes.			
17 05	**soil (including excavated soil from contaminated sites), stones and dredging spoil**		
17 05 03*	soil and stones containing hazardous substances	MH	
17 05 04	soil and stones other than those mentioned in 17 05 03	MN	
17 05 05*	dredging spoil containing hazardous substances	MH	
17 05 06	dredging spoil other than those mentioned in 17 05 05	MN	
17 05 07*	track ballast containing hazardous substances	MH	
17 05 08	track ballast other than those mentioned in 17 05 07	MN	
17 06	**insulation materials and asbestos-containing construction materials**		
17 06 01*	insulation materials containing asbestos	MH	
17 06 03*	other insulation materials consisting of or containing hazardous substances	MH	
17 06 04	insulation materials other than those mentioned in 17 06 01 and 17 06 03	MN	
17 06 05*	construction materials containing asbestos	MH	
17 08	**gypsum-based construction material**		
17 08 01*	gypsum-based construction materials contaminated with hazardous substances	MH	
17 08 02	gypsum-based construction materials other than those mentioned in 17 08 01	MN	
17 09	**other construction and demolition wastes**		
17 09 01*	construction and demolition wastes containing mercury	MH	

Code	Description	Entry Type	Example provided
17 09 02*	construction and demolition wastes containing PCB (for example PCB-containing sealants, PCB-containing resin-based floorings, PCB-containing sealed glazing units, PCB-containing capacitors)	MH	r
17 09 03*	other construction and demolition wastes (including mixed wastes) containing hazardous substances	MH	
17 09 04	mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	MN	
Note 'r': 17 09 02* is used when PCBs are present in an item of construction and demolition waste at a concentration of equal to or greater than 50 mg/kg (0.005%).			
18	**WASTES FROM HUMAN OR ANIMAL HEALTH CARE AND/OR RELATED RESEARCH (except kitchen and restaurant wastes not arising from immediate health care)**		
18 01	**wastes from natal care, diagnosis, treatment or prevention of disease in humans**		
18 01 01	sharps (except 18 01 03)	AN	
18 01 02	Body parts and organs including blood bags and blood preserves (except 18 01 03)	AN	
18 01 03*	wastes whose collection and disposal is subject to special requirements in order to prevent infection	AH	t
18 01 04	wastes whose collection and disposal is not subject to special requirements in order to prevent infection(for example dressings, plaster casts, linen, disposable clothing, diapers)	AN	t,4
18 01 06*	chemicals consisting of or containing hazardous substances	MH	
18 01 07	chemicals other than those mentioned in 18 01 06	MN	
18 01 08*	cytotoxic and cytostatic medicines	AH	s
18 01 09	medicines other than those mentioned in 18 01 08	AN	s
18 01 10*	amalgam waste from dental care	AH	
Note 's': for waste classification purposes, a 'cytotoxic and cytostatic' medicine is defined as any medicine that displays one or more of the hazardous properties: Acute Toxicity (HP 6, Carcinogenic (HP 7), Toxic for Reproduction (HP 10) or Mutagenic (HP 11). Note 't' : See Appendix C9 for use of HP 9 to classify these wastes.			
18 02	**wastes from research, diagnosis, treatment or prevention of disease involving animals**		
18 02 01	sharps (except 18 02 02)	AN	
18 02 02*	wastes whose collection and disposal is subject to special requirements in order to prevent infection	AH	t
18 02 03	wastes whose collection and disposal is not subject to special requirements in order to prevent infection	AN	t,4
18 02 05*	chemicals consisting of or containing hazardous substances	MH	
18 02 06	chemicals other than those mentioned in 18 02 05	MN	
18 02 07*	cytotoxic and cytostatic medicines	AH	s
18 02 08	medicines other than those mentioned in 18 02 07	AN	s
Note 's': for waste classification purposes, a 'cytotoxic and cytostatic' medicine is defined as any medicine that displays one or more of the hazardous properties: Acute Toxicity (HP 6, Carcinogenic (HP 7), Toxic for Reproduction (HP 10) or Mutagenic (HP 11). Note 't' : See Appendix C9 for use of HP 9 to classify these wastes.			

Code	Description	Entry Type	Example provided
19	**WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE**		
19 01	**wastes from incineration or pyrolysis of waste**		
19 01 02	ferrous materials removed from bottom ash	AN	
19 01 05*	filter cake from gas treatment	AH	
19 01 06*	aqueous liquid wastes from gas treatment and other aqueous liquid wastes	AH	
19 01 07*	solid wastes from gas treatment	AH	
19 01 10*	spent activated carbon from flue-gas treatment	AH	
19 01 11*	bottom ash and slag containing hazardous substances	MH	
19 01 12	bottom ash and slag other than those mentioned in 19 01 11	MN	
19 01 13*	fly ash containing hazardous substances	MH	
19 01 14	fly ash other than those mentioned in 19 01 13	MN	
19 01 15*	boiler dust containing hazardous substances	MH	
19 01 16	boiler dust other than those mentioned in 19 01 15	MN	
19 01 17*	pyrolysis wastes containing hazardous substances	MH	
19 01 18	pyrolysis wastes other than those mentioned in 19 01 17	MN	
19 01 19	sands from fluidised beds	AN	
19 01 99	wastes not otherwise specified	AN	
19 02	**wastes from physico/chemical treatments of waste (including dechromatation, decyanidation, neutralisation)**		
19 02 03	premixed wastes composed only of non-hazardous wastes	AN	
19 02 04*	premixed wastes composed of at least one hazardous waste	AH	
19 02 05*	sludges from physico/chemical treatment containing hazardous substances	MH	
19 02 06	sludges from physico/chemical treatment other than those mentioned in 19 02 05	MN	
19 02 07*	oil and concentrates from separation	AH	
19 02 08*	liquid combustible wastes containing hazardous substances	MH	2
19 02 09*	solid combustible wastes containing hazardous substances	MH	
19 02 10	combustible wastes other than those mentioned in 19 02 08 and 19 02 09	MN	
19 02 11*	other wastes containing hazardous substances	MH	2
19 02 99	wastes not otherwise specified	MN	2
19 03	**stabilised/solidified wastes**		
19 03 04*	wastes marked as hazardous, partly stabilised other than 19 03 08	AH	
19 03 05	stabilised wastes other than those mentioned in 19 03 04	AN	
19 03 06*	wastes marked as hazardous, solidified	AH	
19 03 07	solidified wastes other than those mentioned in 19 03 06	AN	
19 03 08*	partly stabilised mercury	AH	

Code	Description	Entry Type	Example provided
19 04	**vitrified waste and wastes from vitrification**		
19 04 01	vitrified waste	AN	
19 04 02*	fly ash and other flue-gas treatment wastes	AH	
19 04 03*	non-vitrified solid phase	AH	
19 04 04	aqueous liquid wastes from vitrified waste tempering	AN	
19 05	**wastes from aerobic treatment of solid wastes**		
19 05 01	non-composted fraction of municipal and similar wastes	AN	
19 05 02	non-composted fraction of animal and vegetable waste	AN	
19 05 03	off-specification compost	AN	
19 05 99	wastes not otherwise specified	AN	2
19 06	**wastes from anaerobic treatment of waste**		
19 06 03	liquor from anaerobic treatment of municipal waste	AN	
19 06 04	digestate from anaerobic treatment of municipal waste	AN	
19 06 05	liquor from anaerobic treatment of animal and vegetable waste	AN	
19 06 06	digestate from anaerobic treatment of animal and vegetable waste	AN	
19 06 99	wastes not otherwise specified	AN	
19 07	**landfill leachate**		
19 07 02*	landfill leachate containing hazardous substances	MH	
19 07 03	landfill leachate other than those mentioned in 19 07 02	MN	
19 08	**wastes from waste water treatment plants not otherwise specified**		
19 08 01	screenings	AN	
19 08 02	waste from desanding	AN	
19 08 05	sludges from treatment of urban waste water	AN	
19 08 06*	saturated or spent ion exchange resins	AH	
19 08 07*	solutions and sludges from regeneration of ion exchangers	AH	
19 08 08*	membrane system waste containing heavy metals	MH	
19 08 09	grease and oil mixture from oil/water separation containing only edible oil and fats	AN	
19 08 10*	grease and oil mixture from oil/water separation other than those mentioned in 19 08 09	AH	
19 08 11*	sludges containing hazardous substances from biological treatment of industrial waste water	MH	
19 08 12	sludges from biological treatment of industrial waste water other than those mentioned in 19 08 11	MN	
19 08 13*	sludges containing hazardous substances from other treatment of industrial waste water	MH	
19 08 14	sludges from other treatment of industrial waste water other than those mentioned in 19 08 13	MN	
19 08 99	wastes not otherwise specified	MN	

Code	Description	Entry Type	Example provided
19 09	**wastes from the preparation of water intended for human consumption or water for industrial use**		
19 09 01	solid waste from primary filtration and screenings	AN	
19 09 02	sludges from water clarification	AN	
19 09 03	sludges from decarbonation	AN	
19 09 04	spent activated carbon	AN	
19 09 05	saturated or spent ion exchange resins	AN	
19 09 06	solutions and sludges from regeneration of ion exchangers	AN	
19 09 99	wastes not otherwise specified	AN	
19 10	**wastes from shredding of metal-containing wastes**		
19 10 01	iron and steel waste	AN	
19 10 02	non-ferrous waste	AN	
19 10 03*	fluff-light fraction and dust containing hazardous substances	MH	
19 10 04	fluff-light fraction and dust other than those mentioned in 19 10 03	MN	
19 10 05*	other fractions containing hazardous substances	MH	
19 10 06	other fractions other than those mentioned in 19 10 05	MN	
19 11	**wastes from oil regeneration**		
19 11 01*	spent filter clays	AH	
19 11 02*	acid tars	AH	
19 11 03*	aqueous liquid wastes	AH	
19 11 04*	wastes from cleaning of fuel with bases	AH	
19 11 05*	sludges from on-site effluent treatment containing hazardous substances	MH	
19 11 06	sludges from on-site effluent treatment other than those mentioned in 19 11 05	MN	
19 11 07*	wastes from flue-gas cleaning	AH	
19 11 99	wastes not otherwise specified	AN	
19 12	**wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified**		
19 12 01	paper and cardboard	AN	
19 12 02	ferrous metal	AN	
19 12 03	non-ferrous metal	AN	
19 12 04	plastic and rubber	AN	
19 12 05	glass	AN	
19 12 06*	wood containing hazardous substances	MH	
19 12 07	wood other than that mentioned in 19 12 06	MN	
19 12 08	textiles	AN	
19 12 09	minerals (for example sand, stones)	AN	
19 12 10	combustible waste (refuse derived fuel)	AN	
19 12 11*	other wastes (including mixtures of materials) from mechanical treatment of waste containing hazardous substances	MH	

Code	Description	Entry Type	Example provided
19 12 12	other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11	MN	
19 13	**wastes from soil and groundwater remediation**		
19 13 01*	solid wastes from soil remediation containing hazardous substances	MH	
19 13 02	solid wastes from soil remediation other than those mentioned in 19 13 01	MN	
19 13 03*	sludges from soil remediation containing hazardous substances	MH	
19 13 04	sludges from soil remediation other than those mentioned in 19 13 03	MN	
19 13 05*	sludges from groundwater remediation containing hazardous substances	MH	
19 13 06	sludges from groundwater remediation other than those mentioned in 19 13 05	MN	
19 13 07*	aqueous liquid wastes and aqueous concentrates from groundwater remediation containing hazardous substances	MH	
19 13 08	aqueous liquid wastes and aqueous concentrates from groundwater remediation other than those mentioned in 19 13 07	MN	
20	**MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS**		
20 01	**separately collected fractions (except 15 01)**		
20 01 01	paper and cardboard	AN	
20 01 02	glass	AN	
20 01 08	biodegradable kitchen and canteen waste	AN	
20 01 10	clothes	AN	
20 01 11	textiles	AN	
20 01 13*	solvents	AH	
20 01 14*	acids	AH	
20 01 15*	alkalines	AH	
20 01 17*	photochemicals	AH	
20 01 19*	pesticides	AH	
20 01 21*	fluorescent tubes and other mercury-containing waste	AH	6
20 01 23*	discarded equipment containing chlorofluorocarbons	AH	6
20 01 25	edible oil and fat	AN	
20 01 26*	oil and fat other than those mentioned in 20 01 25	AH	
20 01 27*	paint, inks, adhesives and resins containing hazardous substances	MH	
20 01 28	paint, inks, adhesives and resins other than those mentioned in 20 01 27	MN	
20 01 29*	detergents containing hazardous substances	MH	
20 01 30	detergents other than those mentioned in 20 01 29	MN	
20 01 31*	cytotoxic and cytostatic medicines	AH	u
20 01 32	medicines other than those mentioned in 20 01 31	AN	u

Code	Description	Entry Type	Example provided
20 01 33*	batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries	AH	5
20 01 34	batteries and accumulators other than those mentioned in 20 01 33	AN	5
20 01 35*	discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components	AH	6
20 01 36	discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35	AN	6
20 01 37*	wood containing hazardous substances	MH	
20 01 38	wood other than that mentioned in 20 01 37	MN	
20 01 39	plastics	AN	
20 01 40	metals	AN	
20 01 41	wastes from chimney sweeping	AN	
20 01 99	other fractions not otherwise specified	AN	4
Note 'u': for waste classification purposes, a 'cytotoxic and cytostatic' medicine is defined as any medicine that displays one or more of the hazardous properties: Acute Toxicity (HP 6, Carcinogenic (HP 7), Toxic for Reproduction (HP 10) or Mutagenic (HP 11).			
20 02	**garden and park wastes (including cemetery waste)**		
20 02 01	biodegradable waste	AN	
20 02 02	soil and stones	AN	
20 02 03	other non-biodegradable wastes	AN	
20 03	**other municipal wastes**		
20 03 01	mixed municipal waste	AN	
20 03 02	waste from markets	AN	
20 03 03	street-cleaning residues	AN	
20 03 04	septic tank sludge	AN	2
20 03 06	waste from sewage cleaning	AN	
20 03 07	bulky waste	AN	
20 03 99	municipal wastes not otherwise specified	AN	

Example 1	Co-collected and mixed wastes
Scope	**Generally applicable.** **This example provides guidance on the coding of co-collected and mixed waste of any type.** **Exception: mixed municipal waste from domestic households ('black bag' waste stream only).**

Mixing of different types of hazardous waste, and of hazardous waste with other waste, substances or materials is prohibited by article 18 of the Waste Framework Directive, unless carried out at a suitably licensed facility that meets certain conditions.

Wastes that have been mixed must be separated where technically and economically feasible. Note, where a single batch or single load of mixed wastes cannot be separated producers and operators are asked to describe the waste in the following manner.

The first step in coding and classifying a mixed waste is to determine how many wastes are present. If more than one separately identifiable waste is present then each must be described and more than one list of waste code will be required.

The general principle is that if 3 items of waste (one each of types A, B and C) are placed in a single container, then that container contains 3 wastes. Each of which must be separately assessed, described and coded.

For example: A lead acid battery in a skip of wood waste from a demolition site would need two codes. The battery is separately identifiable and distinct from the wood waste. The battery would be coded 16 06 01* and the wood would be coded 17 02 01 if it has not been contaminated by being stored with the battery.

The same multiple coding approach is applied to the coding and classification of healthcare waste. For example:

- non-cytotoxic and cytostatic medicinally contaminated sharps from human healthcare (18 01 03* and 18 01 09)
- chemically preserved anatomical waste from human healthcare (18 01 06* and 18 01 03*)

Note: The presence of a code for mixed waste in certain chapters does not allow businesses to mix different types of hazardous waste, or hazardous waste with other wastes, substances or materials.

Scotland: additional notes:
In Scotland you must ensure each waste present is described. However multi-coding of mixed wastes is not allowed and you should classify the waste, on the Special Waste Consignment Note, using a LoW code that reflects the processes that produced the waste and ensures that the most appropriate disposal route is followed.

There is no de-minimis for the levels of hazardous waste if mixed with a non-hazardous waste. For example, a batch of non-hazardous construction waste (17 09 04) if mixed with PCB containing wastes, such as PCB containing resin-based floorings, should be coded as 17 09 02* - construction and demolition wastes containing PCBs.

Example 2	Aqueous liquids or concentrates
Scope	**This example provides guidance on the use of chapter 16 to coding aqueous liquids and concentrates for which appropriate entries are not available in chapters 1 to 12, 17 to 20, and 13 to 15.**

There are some liquid wastes where no appropriate code can be found in the waste source chapters (1-12, 17-20) such as liquor from composting and portable toilet waste.

The instructions for use of the list of waste indicate that the waste specific chapters (13,14, & 15) must be considered next.

If a code still cannot be found then an appropriate code from chapter 16 (waste not otherwise specified in the list) can be chosen.

Only if a code cannot be found in chapter 16 could a 99 code from one of the waste source chapters be used.

However chapter 16 does contain general codes for all aqueous wastes and aqueous concentrates in subchapter 16 10 (aqueous liquid wastes destined for off-site treatment):

16 10 01* aqueous liquid waste containing hazardous substances	MH
16 10 02 aqueous liquid waste other than those mentioned in 16 10 01	MN
16 10 03* aqueous concentrates containing hazardous substances	MH
16 10 04 aqueous concentrates other than those mentioned in 16 10 03	MN

To determine the most appropriate code the aqueous waste must:

- first be classified as either a liquid or a concentrate
- then assessed for hazardous substances

If hazardous substances are present above the threshold the waste will be hazardous by either 16 10 01* or 16 10 03*. A substance should be considered to be a 'concentrate' or not on a case by case basis.

Composting liquor: waste from composting is mainly covered in sub-chapter 19 05 (waste from aerobic treatment of waste). However, there is currently no code that adequately describes any liquid waste from this process. Before the 99 code can be used from this sub-chapter the waste specific chapters (13, 14 & 15) must be considered first, and if a code cannot be found there,then the appropriate code from chapter 16 can be selected.

Waste from a portable toilet: this entry is a household / municipal waste but there is no specific entry in chapter 20 for it. There are no entries in chapters 13 to 15 either. The most appropriate entries in the list are again found in chapter 16.

Aqueous washing liquids and mother liquors from organic chemical processes**:** Chapter 7 provides 'absolute hazardous' codes that must be used for these wastes, even if the waste has no hazardous properties.

Example 3	End of life vehicles (ELV's)
Scope	**The example provides guidance on the classification of any vehicle that is waste.**

The codes for End-of-life vehicles are found in sub-chapter 16 01:

16 01 04* end-of-life vehicles	AH
16 01 06 end-of-life vehicles, containing neither liquids nor other hazardous components	AN

These entries should be used to code waste cars, coaches, lorries, helicopters, planes, boats, ships, tractors, motorcycles and any other waste vehicle. It should equally be considered to include waste trailers, caravans and similar.

This definition of an end-of-life vehicle is wider than the one given in the end-of life vehicles directive[1] so there will be some vehicles that will be appropriately coded by the LoW but not be obligated under that directive.

The entries 16 01 04* and 16 01 06 are obviously linked together but are not mirror entries. If a vehicle has been fully depolluted, such that all components that are hazardous have been removed, then it falls under 16 01 06.

If it contains any hazardous liquids (like petrol, diesel, brake fluid or oil etc.) or other hazardous components (such as batteries or switches containing mercury) then it is coded under 16 01 04*.

Guidance on the requirements for depolluting ELVs can be found on the Department for Business Innovation and Skills (BIS) website[2].

Example 4	Offensive waste from non-healthcare sources
Scope	**This example provides guidance on the classification of a range of offensive wastes from municipal activities.** **This excludes offensive waste arising from healthcare activities by healthcare staff or self-care by patients.**

Examples of municipal offensive waste include:

- dog faeces from collection bins
- dog/cat faeces and animal bedding from kennels/catteries
- feminine hygiene wastes
- nappy wastes from nurseries
- domestic type incontinence wastes

Separately collected fractions of these wastes are coded as:

20 01 99 other fractions not otherwise specified	AN

Segregation of these wastes as a discrete waste stream is expected where they are produced by businesses in quantity (approx 7kg or 1 bag per interval period). A failure to segregate may have significant implications for the subsequent management of other waste it is mixed with.

Non-healthcare businesses (like householders) may dispose of smaller quantities in their mixed municipal waste ('black bag') without it affecting the classification or management of that waste.

These wastes are not normally considered to be clinical wastes unless a healthcare professional identifies through risk assessment that waste may be infectious. It retains the same 20 01 99 classification code, but must be identified and managed as clinical. Further guidance is provided by the Safe Management of Healthcare Waste.

[1] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2000L0053:20050701:EN:PDF

[2] http://www.bis.gov.uk/assets/biscore/business-sectors/docs/d/11-528-depolluting-end-of-life-vehicles-guidance

Example 5	Municipal batteries
Scope	**This example provides guidance on household type batteries produced by both households and businesses.** **It does not apply to lead acid vehicle and other larger / specialist batteries produced by businesses. These are classified under chapter 16.**

There are two codes applicable to domestic type waste batteries from domestic households and businesses:

20 01 33* batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries AH

20 01 34 batteries and other accumulators other than those mentioned in 20 01 33 AN

20 01 34 should only be used when it is known that all the batteries present are non-hazardous (i.e. when the batteries have been sorted and identified by someone competent in doing so).

20 01 33* should be used in all other circumstances including for;

- co-collected unsorted or unassessed batteries where the presence of one or more hazardous batteries cannot be ruled out, and
- hazardous batteries segregated from other types of batteries

Example 6	Waste electronic and electrical equipment (WEEE)
Scope	**This example provides guidance on the classification of waste electronic and electrical equipment (WEEE) and related components.**

The list of waste contains entries for WEEE in two chapters, 16 and 20.WEEE from domestic households, and items of a similar type from industrial and commercial sources household, is classified in chapter 20. This chapter takes precedence over chapter 16.

20 01 21*	fluorescent tubes and other mercury-containing waste	AH
20 01 23*	discarded equipment containing chlorofluorocarbons	AH
20 01 35*	discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components	AH
20 01 36	discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35	AN

Commercial / Industrial-type or sized equipment, that a domestic household would not typically produce, would be classified under chapter 16.

16 02 09*	transformers and capacitors containing PCBs	AH
16 02 10*	discarded equipment containing or contaminated by PCBs other than those mentioned in 16 02 09	AH
16 02 11*	discarded equipment containing chlorofluorocarbons, HCFC, HFC	AH
16 02 12*	discarded equipment containing free asbestos	AH
16 02 13*	discarded equipment containing hazardous components other than those mentioned in 16 02 09 to 16 02 12	AH
16 02 14	discarded equipment other than those mentioned in 16 02 09 to 16 02 13	AN

A computer monitor or television or tea room fridge from a commercial premises of a similar type to those used by households would be classified under sub-chapter 20 01.

However a supermarket's larger chiller cabinet or freezer units containing hazardous chlorofluorocarbons (CFCs) would be coded 16 02 11*.

The vast majority of fluorescent tubes from any source are likely to be similar to domestic types and fall under 20 01 21*.

The entries 20 01 35* and 16 02 13* are absolute hazardous entries because a 'hazardous component' is not a hazardous substance either specifically or generally. It is the presence or absence of a hazardous component in the equipment that determines code is used. If no hazardous component is present in the equipment then 20 01 36 or 16 02 14 would be appropriate.

A hazardous component is a component either

- listed in the LoW as hazardous, or
- any other component that would possess a hazardous property if assessed in isolation

The list of waste specifies that hazardous components include hazardous accumulators/batteries (ones coded 16 06 01* to 16 06 03*); mercury switches; glass from cathode ray tubes and other activated glass; mercury containing backlights and other similar items.

Similarly the entries 20 01 23*, 16 02 09* to 16 02 12* are also absolute hazardous component entries which contain reference to specific hazardous substances. The component alone is assessed to determine whether it is hazardous due to the presence of the specific hazardous substance. The entry is used if the equipment contains a component assessed to be a hazardous due to that substance (for example asbestos containing components like cables, washers or insulation). If it does not then the other entries in this sub-chapter (both hazardous and non-hazardous) must be considered.

Co-collected small WEEE from Civic Amenity sites, unless hazardous WEEE has been identified and removed, should be dual coded **both** as 20 01 35* **and** 20 01 36. (Note: In Scotland the waste would be classified as 20 01 35* and the presence of non-hazardous waste included in the written

description).

Example 7	Packaging waste and contents
Scope	**This example provides advice on the classification of any waste packaging to determine if:** **(i) the waste is classified as empty packaging or contents** **(ii) the empty packaging is hazardous or not**

Key Point: Packaging wastes cannot legally be classified under chapter 20 01. The title for chapter 20 01 excludes waste packaging, which is included in sub-chapter 15 01.

- '20 01 separately collected fractions (except 15 01)'

Chapter 15 of the LoW contains the following codes for waste packaging:

15 01 01 paper and cardboard packaging	AN
15 01 02 plastic packaging	AN
15 01 03 wooden packaging	AN
15 01 04 metallic packaging	AN
15 01 05 composite packaging	AN
15 01 06 mixed packaging	AN
15 01 07 glass packaging	AN
15 01 09 textile packaging	AN
15 01 10* packaging containing residues of or contaminated by hazardous substances	AH
15 01 11* metallic packaging containing a hazardous solid porous matrix (for example asbestos), including empty pressure containers	AH

To apply these codes two decisions must be made:

- firstly, should the waste be classified as packaging waste or as its contents, and
- secondly, if it is packaging waste, which code is appropriate

A flowchart is provided to support this text in Figure A.7

Is the waste waste packaging or waste contents ?

For a waste container to be classed as a packaging waste (15 01) it must be effectively 'empty'.

It is usually obvious if a container is 'empty', for example a half empty tin of solidified paint is not empty, but where there is a small amount of residual material a container will not be empty if that residual material can be removed by physical or mechanical means by applying normal industry standards or processes.

This means that all reasonable efforts must have been made to remove any left-over contents from the container. This may involve for example washing, draining or scraping. The method of emptying will depend on the container and the type of material it contains.

Note: if the design of the packaging, its aperture, or the adherent nature of the material does not permit it to be emptied then it will not be a packaging waste.

If a container is not 'empty' it is not packaging waste. It should be classified on the basis of its contents and the source or activity that produced it. For example 08 01 11* waste paint and varnish containing organic solvents or other dangerous substances.

Where waste containers are washed to remove contents and make them 'empty' then appropriate

consideration must be given to:

- the trade effluent consent for any disposal of washings to foul sewer
- a suitable authorisation for the treatment of waste (which would not be an issue where the producer is using washing to remove remaining product to enable its use as product, for example in an agricultural setting)
- potential reactions with the contents, for example washing containers of water reactive substances with water is not recommended

Classifying and assessing the waste packaging

If a container is 'empty' the packaging waste entries can then be considered.

The next step is to determine if the packaging:

- is contaminated or contains any residue, and
- if that contamination or residue contains hazardous substances

Any residue or contamination is assessed in isolation, excluding the weight of the packaging, to determine if it displays a hazardous property. Empty packaging containing residues of, or contaminated by, hazardous substances that display a hazardous property is classified as 15 01 10*. This is an absolute hazardous entry. Examples of this would include:

- An **empty** drum of diesel fuel containing any quantity of residual diesel (diesel fuel is hazardous, and possesses a range of hazardous properties), or
- A **empty** paint can, labelled with category of danger symbols, both contaminated with and containing dried paint residues of a paint containing ecotoxic heavy metals (note that the drying of paint may increase the concentration of other hazardous substances present as water/solvent evaporates)

If the packaging:

(i) does not contain any contamination or residue (e.g. the residues and contamination have been removed by effective cleaning), or

(ii) the contamination or residual material is not a hazardous substance(s)

then you consider whether the packaging material is itself made of hazardous material.

Some packaging can have as part of its construction a hazardous solid material; for example some old fireproof packaging may contain asbestos. If this is the case the packaging waste will be considered 15 01 11*, an absolute entry.

The appropriate non-hazardous packaging code is applied to empty packaging if:

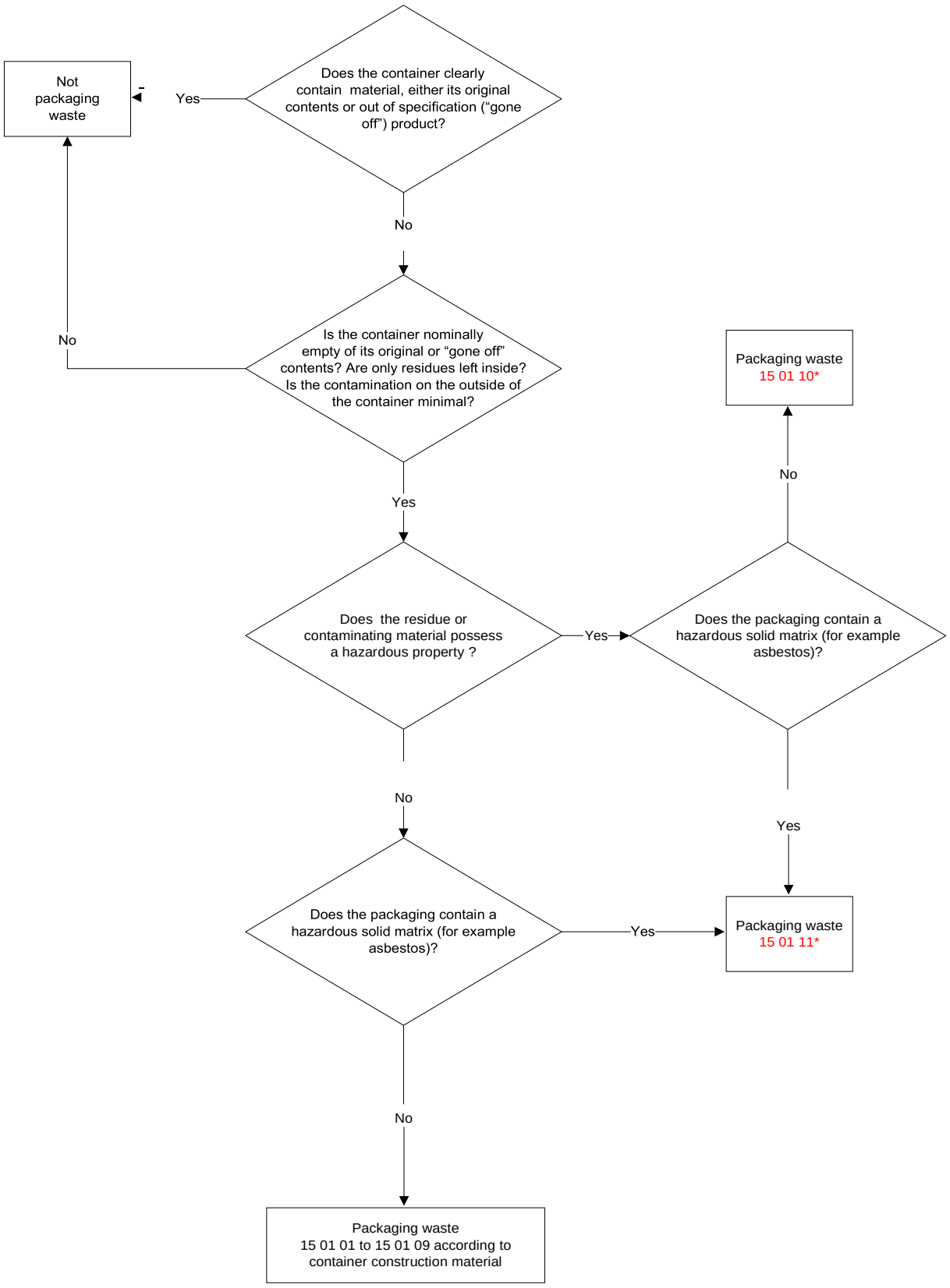
- both residues and contamination are absent, or
- the residues and contamination do not possess a hazardous property

and

- the container is not made of a hazardous solid material

Note: An industry working group is considering alternative approaches to the classification of waste packaging. Once this work is complete the Joint Agencies will consider any alternatives proposed, and if adopted, amend this example. This example continues to apply until it is amended.

Figure A7 | The application of waste packaging codes



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Appendix B:

Hazardous substances

This appendix provides guidance on how to work out both:

- if a substance is a hazardous substance
- the chemical classification of that substance

This supports Chapter 2' Waste classification and assessment', Step 5: 'identify if the substances in the waste are 'hazardous substances' or 'Persistent Organic Pollutants'.'

Hazardous substances

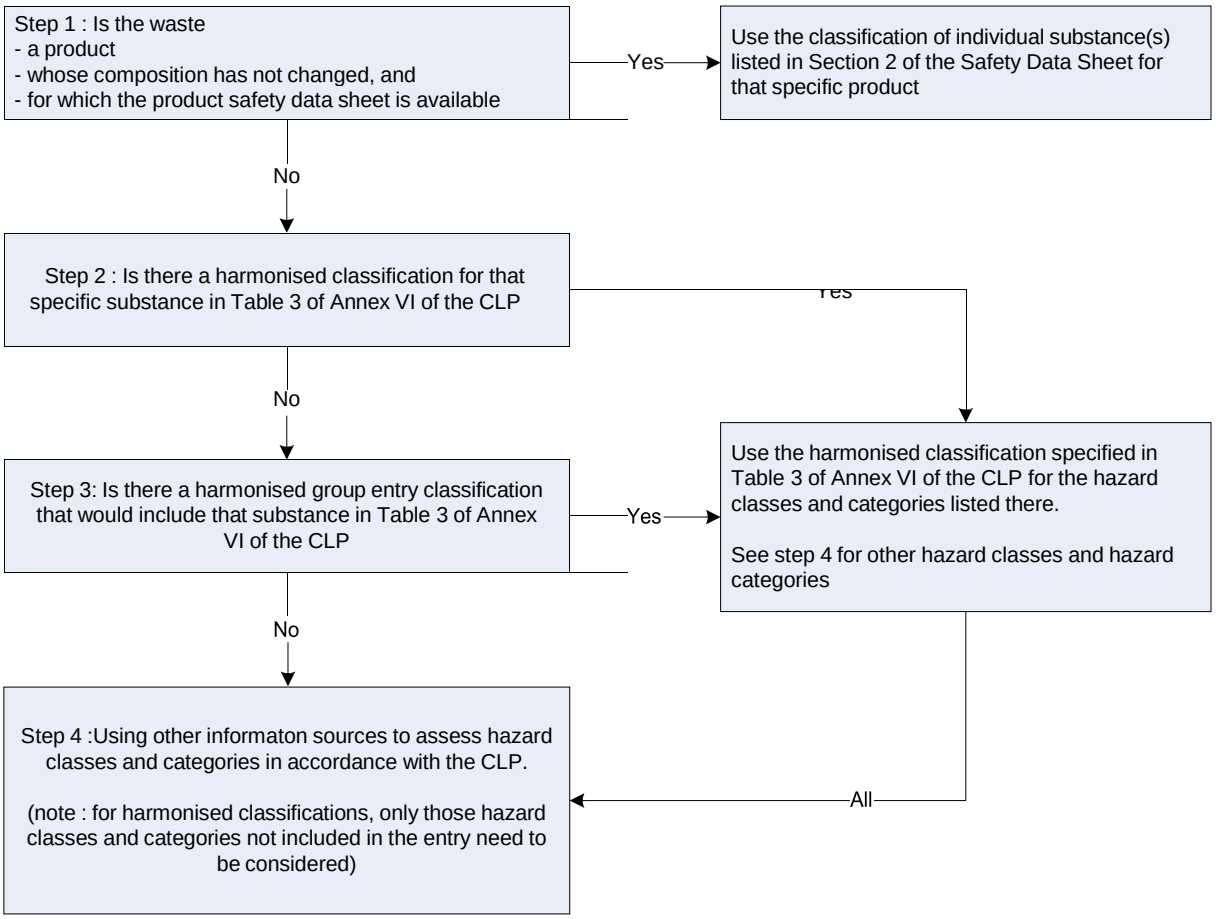
The Classification, Labelling and Packaging of Substances and Mixtures Regulation 1272/2008 (CLP) provides the criteria to assess the physical, human health and environmental hazards of substances.

A hazardous substance is a substance that is assigned a hazard statement code when classified using the CLP.

The chemical classification of a substance (in the form it exists in the waste) must be worked out using the criteria in the CLP using the European Chemical Agency's guidance on how to apply it.

The flow chart (Figure B1.1) gives an overview on how to apply this to waste assessment and classification. You must always use the written guidance in this appendix with the flowchart.

Figure B1.1 An overview of the chemical classification process for a substance



Step 1: Check if the waste is a product and with a safety data sheet

The manufacturer or supplier's safety data sheet (SDS) for a specific product will include information on the composition and classification of a substance or mixture. The chemical classification of the substance(s) present should be listed in Section 3 of the SDS 'Composition, Information on Ingredients'.

If the waste was a manufactured product (e.g. a pot of paint), check if:

- the composition of the product is unchanged,
- the product has been classified in accordance with the classification criteriain the CLP
- There is an SDS for that product

If you have that information, you can normally rely on the chemical classification of the individual ingredient or component substance(s) provided in the safety data sheet for waste classification when used for the transport, repackaging, or storage of waste.

Where the product is a mixture of two or more substances (e.g. a pot of paint), you must use the classifications of the individual component substances rather than the overall chemical classification of the product.

If you are taking any action that may change the composition or physical form of the product, for example treating the waste, then you should not rely on this information.

You will need to do additional checks where the information provided either:

- was out of date (as a product may be discarded some time after it was last supplied)
- there is any reason to believe it is incomplete, inadequate, or inaccurate

Step 2: Substances listed in Table 3 of the CLP: check if there's a 'harmonised' classification

Some substances have been assigned classifications agreed at European level. These are called 'harmonised' classifications and are listed in Table 3 of Part 3 of Annex VI of the CLP Regulation. The hazard classes and categories presented in Table 3 take legal precedence (Article 4(3) of the CLP) over all other sources of information on those hazard classes and categories, and they must be used for classification.

A harmonised classification in Table 3 may be incomplete as it only covers the hazard classes and categories listed. So you must always also consider Step 4 for those hazard classes and categories not covered by the Table 3 entry.

Table 3 of Annex VI of the CLP is regularly updated by adaptations to technical progress (ATP's) so you must make sure you're using the most up to date legal classification of the substance.

Table 3 contains two types of harmonised entries, for;

- specific substances (for use in this step), and
- group entries (for use in step 3)

Harmonised classifications can also be found in the Classification and Labelling Inventory maintained by the European Chemical Agency (ECHA) but Table 3 of Annex VI of the CLP remains the authoritative legal source for this information.

The inventory: how to use it for waste classification

We have used lead chromate as the example.

The inventory's search page enables you to find classification entries.

https://echa.europa.eu/information-on-chemicals/cl-inventory-database

-

To search for a substance:

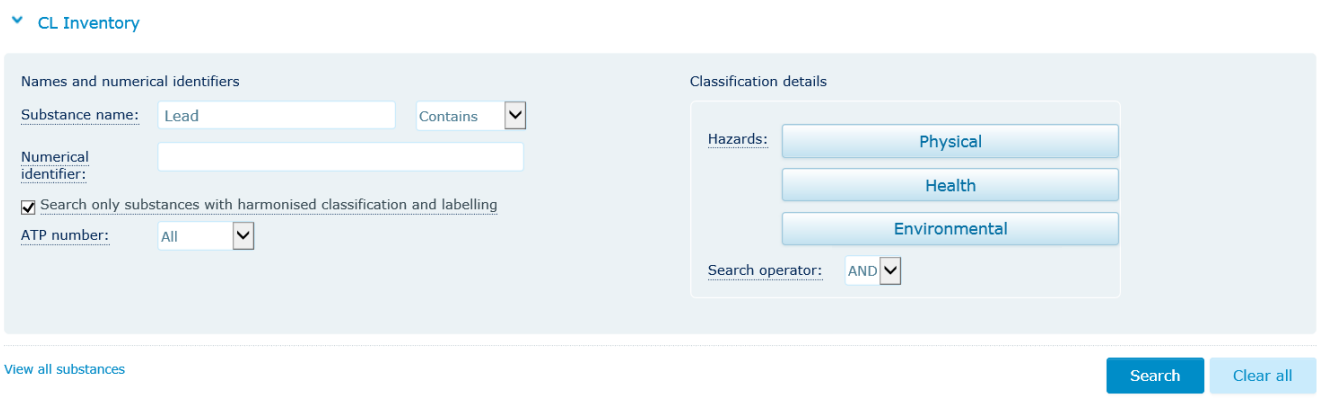
- enter the substance name in ‘substance name’ field (or use other identifiers)
- tick the ‘search only for harmonised substances’
- read and agree the ‘legal disclaimer’.

When entering the substance name consider using a partial name (for example using 'lead' to search for lead chromate), be aware of international spelling differences (sulfide vs. sulphide), and that some substances may have several names.

> Note:
>
> To help you identify the substance correctly the inventory includes both:
>
> - certain alternative chemical names in the **'International Chemical Identification'** section
> - the Chemical Abstract Service (**CAS**) number, which is the most accurate identification of a substance that may have many non-standard names

Figure B1.2 shows the search for 'lead' to find a harmonised classification for lead chromate.

Figure B1.2 | Example of a search in the classification and labelling inventory



This search results (see figure B1.3) show a list of all harmonised entries for lead including a specific entry for lead chromate (used in step 2) and a group entry for lead compounds (used in step 3).

Name	EC / List no.	CAS no.	Index no.	
lead hexafluorosilicate	247-278-1	25808-74-6	009-014-00-1	
silicic acid, lead nickel salt		68130-19-8	028-050-00-9	
lead compounds with the exception of those specified elsewhere in this Annex			082-001-00-6	
lead alkyls			082-002-00-1	
lead diazide lead azide	236-542-1	13424-46-9	082-003-00-7	
lead diazide lead azide [≥ 20 % phlegmatiser]	236-542-1	13424-46-9	082-003-01-4	
lead chromate	231-846-0	7758-97-6	082-004-00-2	
lead di(acetate)	206-104-4	301-04-2, 6080-56-4	082-005-00-8	
trilead bis(orthophosphate)	231-205-5	7446-27-7	082-006-00-3	
lead acetate, basic	215-630-3	1335-32-6	082-007-00-9	

Select the symbol on the right of lead chromate. This provides the harmonised classification.

Figure B1.4 | Example of a harmonised classification from the Classification and Labelling Inventory

Harmonised classification - Annex VI of Regulation (EC) No 1272/2008 (CLP Regulation)

General Information

Index Number	EC / List no.	CAS Number	International Chemical Identification
082-004-00-2	231-846-0	7758-97-6	lead chromate

ATP Inserted / Updated: CLP00/ATP01

CLP Classification (Table 3)

Classification		Labelling			Specific Concentration limits, M-Factors, Acute Toxicity Estimates (ATE)	Notes
Hazard Class and Category Code (s)	Hazard Statement Code (s)	Hazard Statement Code (s)	Supplementary Hazard Statement Code (s)	Pictograms, Signal Word Code (s)		
Carc. 1B	H350	H350		GHS09 GHS08 Dgr		Note 1
STOT RE 2	H373 **	H373 **				
Aquatic Acute 1	H400					
Aquatic Chronic 1	H410	H410				
Repr. 1A	H360Df	H360Df				

Signal Words	Pictograms	
Danger	Environment	Health hazard

The **'Harmonised Classification'** provides the following information used for waste classification:

'Classification' column

- 'Hazard class and category code(s)
- 'Hazard statement code(s)

'Labelling' column

- Supplementary hazard statement code(s)

'Notes' column (some notes are used for waste classification)

The hazard classes, hazard categories, hazard statement codes and supplementary hazard statement codes listed in the harmonised entry for the substance have legal precedence over other information sources for substance classification purposes.

The meaning of hazard class, category and hazard statement code	
Hazard Class	The nature of the hazard. For example a carcinogen is 'Carc.'.
Hazard Category	A sub-category of the hazard class that describes the severity of the hazard. For example a carcinogen could be '1A', '1B' or '2'.
Hazard Statement Code	The code assigned to the hazard class and category. For example a carcinogen could be 'H350' or 'H351'

So from Figure B1.4 the harmonised hazard classes, categories and statement codes for lead chromate are:

- Carc. 1B H350
- Repr. 1A H360Df
- STOT RE 2* H373**
- Aquatic Acute 1 H400
- Aquatic Chronic 1 H410

You need to note these, then proceed to step 4.

Further notes on using Table 3 of the CLP

The following apply when using Table 3.1 for waste classification:

Specific Concentration Limits

Note: 'Specific Concentration Limits' are used only where indicated in Appendix C for a specific hazardous property.

Qualifications of hazard class, category codes and statements codes

The following may be assigned to entries in the classification column of Table 3 of the CLP and appear in the Inventory

Qualifications	Meaning	Used for Waste Assessment
*	Minimum classification for that hazard class/category. Actual classification may be higher. (This is applied to Acute Toxicity, STOT repeated exposure)	Yes
**	Relates to route of exposure	No
***	Assigned to reproductive toxicity hazard statements where one attribute is not applicable	No
****	indicates that the correct classification for physical hazards could not be established. The entry might be assigned to a different (also higher) category or even another hazard class than indicated. The correct classification shall be confirmed by testing.	Yes
D, d, F, f, DF, Df, Fd, fd	assigned to reproductive toxicity hazard statements to indicate **d**evelopmental and **f**ertility effects. This is not relevant to waste assessment.	No

Supporting 'Notes' column

The CLP contains two series of supporting **'Notes'**.

- The alphabetic series (Note A, B, etc.) labelled '**Notes'** apply to substances and are only relevant to waste classification and assessment where they alter the harmonised classification of the substance to which they relate. The following notes may be used where appropriate B, D, F, J, L, M, P, Q, R and U. The numeric series (Note 1, 2, etc.) labelled '**Notes'** apply to mixtures and are not used to determine the classification of a substance. Notes 1, 2, 3 and 5 can be used where appropriate. These notes explain how the concentration limits for hazardous properties (See Appendix C) are applied to a waste containing that substance. Note 1, for example, is applicable to any hazardous properties where the calculation method is used for that substance in a waste).

Anhydrous and hydrated salts

Harmonised group entries in Part 3 for salts (under any denomination) cover both anhydrous and hydrous forms, unless specified otherwise.

.

Step 3: check if there's a harmonised group entry in Table 3 of the CLP

If there's no 'harmonised entry' for the specific substance in the CLP, then you must repeat the previous step and check if the substance is covered by a harmonised group entry.

A number of group entries are included in Table 3 of the CLP. The classification applies to all substances covered by the group entry description, with the exception of this substances that have a specific harmonised entry (see step 2).

In some cases, individual substances may be covered by more than one group entry (e.g. where there are group entries for both the cation and anion of a substance). Where this occurs the classification of the substance includes all the hazard classes, categories and statement codes from these group entries. Where group entries give different classifications for the same hazard, use the most severe.

Examples of group entries are arsenic, lead, cadmium, chromium, mercury, organo-tin, antimony, beryllium, barium and cyanide compounds.

Search for these by ticking the 'search only for harmonised substances' box like you did in the previous step but:

- use a partial substance name (eg lead) or group name where relevant
- and if this identifies no relevant entry, you can produce a list containing most of the group harmonised entries by entering 'exception' in the substance name field

So, a search for 'lead sulphate' identifies no substance specific harmonised entry, but a search for 'lead' identifies the harmonised entry for 'lead compounds with the exception of those specified elsewhere in this annex' (see figure B1.3) that applies to all lead compounds that do not have a substance specific entry.

The harmonised classification for lead sulphate, using this group entry, is set out in Figure B1.5.

Figure B1.5 | Example of a group harmonised entry from the Classification and Labelling Inventory

Summary of Classification and Labelling

Harmonised classification - Annex VI of Regulation (EC) No 1272/2008 (CLP Regulation)

General Information

Index Number	EC / List no.	CAS Number	International Chemical Identification
082-001-00-6			lead compounds with the exception of those specified elsewhere in this Annex

ATP Inserted / Updated: CLP00

CLP Classification (Table 3)

Classification		Labelling			Specific Concentration limits, M-Factors, Acute Toxicity Estimates (ATE)	Notes
Hazard Class and Category Code (s)	Hazard Statement Code (s)	Hazard Statement Code (s)	Supplementary Hazard Statement Code (s)	Pictograms, Signal Word Code (s)		
Acute Tox. 4 *	H302	H302		GHS09 GHS08 GHS07 Dgr	Repr. 2; H361f: C ≥ 2,5 % STOT RE 2; H373: C ≥ 0,5 %	Note A Note 1
Acute Tox. 4 *	H332	H332				
STOT RE 2 *	H373 **	H373 **				
Aquatic Acute 1	H400					
Aquatic Chronic 1	H410	H410				
Repr. 1A	H360Df	H360Df				

You must not use a group harmonised entry (for example, lead or chromium VI compounds) where a substance specific entry is provided.(eg lead chromate).

You must consider the hazard classes, hazard categories and hazard statement codes (including supplementary hazard statement codes) listed in the 'harmonised entry' to classify and assess waste.

Once you have noted these, proceed to step 4.

Step 4: Using other information sources

This step classifies a substance using the procedures and criteria set out in CLP. You need to be able to use CLP competently. If you are unsure how to proceed you should seek advice from a competent person.

Classification is essential for safe chemical management. It's vital that classification is based on accurate, robust and adequate data/information.

If the substance does not have a harmonised entry you must consider all hazard classes and categories.

If the substance has a harmonised classification in Table 3 of Annex VI of CLP you only need to identify and consider those hazard classes and categories that are:

- not listed in the harmonised classification
- marked with an '*' indicating that it is a minimum classification, and you are obliged to look for additional data to determine if a more severe classification for that category is justified
- marked with an '****' indicating that the correct classification for physical hazards could not be established, and that testing is necessary. Wastes containing such substances will need to be tested for physical hazardous properties (HP1, HP2 and HP3) as part of their hazardous property assessment in Chapter 2.

Using the lead sulphate harmonised group entry example from step 3, only the following need to be considered further (where applicable):

- physical hazards (for example, explosive, flammable and oxidising hazard classes and categories)
- human health hazards – for example, carcinogenicity, germ cell mutagenicity, irritancy, corrosivity, sensitising)
- environmental hazards – ozone
- acute Toxicity and STOT RE 2 (marked as '*')

Note:

- entries relating to coal, oil and their derivatives or fractions are particularly likely to be incomplete (advice on unknown oils is provided in Appendix A)
- harmonised entries for 'active substances' (regulated biocides, pesticides and herbicides) can be assumed to be complete due to the additional scrutiny they receive

The next step is to gather any information relevant to working out the substance classification, and in particular any:

- data generated from any test methods appropriate to the CLP
- epidemiological data and experience on the effects on humans, such as occupational data and data from accident databases
- any other information generated in accordance with REACH
- any new scientific information
- any other information generated under internationally recognised chemical programmes (Information on some of these is provided later)

The information applies to the physical form of the substance present in the waste.

Download the ECHA guidance on the application of the CLP criteria to classify a substance.

https://echa.europa.eu/documents/10162/23036412/clp_en.pdf/58b5dc6d-ac2a-4910-9702-e9e1f5051cc5

Once you have completed the classification of each substance, return to the Chapter 2, step 5.

Information generated in accordance with REACH

ECHA makes publicly available some of the information companies submit when they register their substances, including their classification under the CLP.

See the information on registered substances at:

http://echa.europa.eu/information-on-chemicals/registered-substances

The information is provided by companies and:

- is not verified by ECHA
- the amount of information present can vary, as requirements relate to production volume
- not all data may be available for all substances

You should use this information in conjunction with other relevant and available information.

This REACH information is also published as part of the OECD (organisation for economic co-operation and development) on their e-chemportal with other international chemical databases.

The e-chemportal can be found at:

http://www.echemportal.org

Carcinogenicity and the International Agency for Research on Cancer (IARC)

When considering the carcinogenicity of a substance it is important to consider the information provided by International Agency for Research on Cancer (IARC).

Although there is a strong link between the classification criteria used by the CLP and that used by IARC, they are two different classification systems.

IARC publishes and maintains a list that includes substances classified as carcinogens on their website, supported by detailed monographs.

Download the list of IARC carcinogens:

http://monographs.iarc.fr/ENG/Classification/ClassificationsAlphaOrder.pdf

These monographs set out the information identified by IARC and their interpretation of it. You should consider the information gathered and assessed by IARC as part of the determination of the classification of the substance under the CLP in step 4, in conjunction with other available and relevant information. A competent person will need to do this.

Pesticides, biocides and herbicides ('active substances')

A wide range of metal compounds and organic compounds are used as active substances in plant protection products. As active substances they have been subjected to additional scrutiny for approval and authorisation.

The European Food Safety Authority (EFSA) has led a formal review of these compounds by member states. As a result, EFSA publish a significant amount of information that can be used for chemical classification .

The Pesticide Properties Database collates this, as well as information from other sources:

http://sitem.herts.ac.uk/aeru/ppdb/en/index.htm

The Classification and Labelling Inventory (self-classifications)

The Classification and Labelling Inventory also contains substance self-classifications submitted to ECHA by businesses. This includes information on substances registered under REACH. These are classifications determined by suppliers themselves through the application of the CLP classification criteria. Self-classifications can be listed for substances that have harmonised classifications, although they cover those hazard classes and hazard categories that are not included in the harmonised entry.

There can be multiple classifications for the same substance due to:

- the different composition, form or physical state of the substance placed on the market
- a manufacturer or producer identifying insufficient information to assess that hazard class or category (which they will report as ‘data lacking’, ‘inconclusive’, or ‘conclusive but not sufficient for classification’)
- the manufacturer, importer or downstream user has access to, or has generated, different or additional data

This information does not remove obligation to consider the available and relevant information in Step 4 to derive the classification of the substance. But knowing what hazard classes and categories other businesses have already identified may help inform this process.

Appendix C:

Hazardous property assessment

This appendix explains how to work out if a waste:

- displays a hazardous property, or
- is hazardous because it contains Persistent Organic Pollutants

This supports Chapter 2 'Waste classification and assessment', step 6 'Assess the hazardous properties of the waste'.

This appendix gives:

- a definition and interpretation of each hazardous property
- the 'hazard statement codes' linked to the hazardous property
- an assessment flow chart
- concentration limits, where applicable
- test methods, where applicable

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Appendix C:

C1 Assessment of Hazard HP 1: Explosive

Definition

Annex III of the Waste Framework Directive[1] (WFD) defines HP 1 'Explosive' as:

'waste which is capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic waste, explosive organic peroxide waste and explosive self-reactive waste is included'

Concentration limit

A waste is assessed for HP using test methods, rather than concentration limits for substances. The WFD states that:

> 'When a waste contains one or more substances classified by one of the hazard class and category codes and hazard statement codes shown in Table 1 [see Table C1.1], the waste shall be assessed for HP 1, where appropriate and proportionate, according to test methods. If the presence of a substance, a mixture or an article indicates that the waste is explosive, it shall be classified as hazardous by HP 1.'

A waste containing substances that are classified with the hazard class, category and statement codes in Table C1.1 can be tested to show whether it displays that hazardous property or not. Alternatively a waste containing those substances can simply be assumed to be hazardous by HP 1.

Additionally, where a waste mixture or article is known to be explosive it too shall be assigned HP 1.

Table C1.1 Hazard class and category code(s) and Hazard statement code(s) for waste constituents for the classification of wastes as hazardous by HP 1 Explosive

Hazard class and category code(s)	Hazard statement code(s)	Description
Unst. Expl.	H 200	Unstable explosives
Expl. 1.1	H 201	Explosive; mass explosion hazard.
Expl. 1.2	H 202	Explosive, severe projection hazard
Expl. 1.3	H 203	Explosive; fire, blast or projection hazard
Expl. 1.4	H 204	Fire or projection hazard
Self-react. A	H 240	Heating may cause an explosion
Org. Perox. A		
Self-react. B	H 241	Heating may cause a fire or explosion
Org. Perox. B		

Some substances may be explosive under certain conditions. They are given Hazard statement codes such as 'H205 May mass explode in fire' or 'EUH001 Explosive when dry'. These substances do not make a waste hazardous by HP 1 Explosive but their presence in a waste could make that waste exhibit hazardous property HP 15; see Section C15 for more details.

[1] Council Directive 2008/98/EC

A waste containing a substance classified as H240 or H241 should be considered for HP 3 flammable where the waste is not hazardous by HP 1.

Cut off value for organic peroxides

A waste containing organic peroxides classified as H240 or H241 needs to be assessed for HP 1 unless both:

- no other hazardous substances assigned hazard statement codes listed in Table C1.1 are present, and
- one of the following two criteria is met, the waste contains:
  - (i) >1% but ≤ 7% hydrogen peroxide, and the available oxygen content of the organic peroxide(s) is ≤ 0.5%
  - (ii) ≤ 1% hydrogen peroxide, and the available oxygen content of the organic peroxide(s) is ≤ 1%

The available oxygen content, O_i (%) for any given organic peroxide is given in Box C1.1. An example of how a waste containing an organic peroxide can be assessed for HP 1 is given in Box C1.2.

Box C1.1 | Available oxygen content for an organic peroxide

$$Oi\ (\%) = \sum\left(16 \text{ x } (\text{ni x ci / mi})\right)$$

where:

ni = number of peroxide groups per molecule of organic peroxide i.

ci = concentration (mass %) of organic peroxide i in the waste.

mi = gram molecular mass of organic peroxide i.

∑ means that if a waste contains more than one organic peroxide the available oxygen from each is added together. This includes all organic peroxides, and is not restricted to those classified as H240 or H241.

Box C1.2 | An example assessment of a waste containing organic peroxide

Example calculation for methyl ethyl peroxide

A waste contains 2.9% methyl ethyl peroxide (C_2H_5-O-O-CH_3) and 3% hydrogen peroxide.

The concentration of hydrogen peroxide is > 1% and ≤ 7% hydrogen peroxide so criteria (i) applies.

Methyl ethyl peroxide has

- molecular mass 76 g, so mi is 76;
- one peroxide functional group present, so, ni = 1.

$$O_i\ (\%) = \sum\left(16 \text{ x } (\text{ni x ci / mi})\right)$$

At 2.9% concentration (ci) in the waste, methyl ethyl peroxide has an available oxygen content

= 16 x 1 x 2.9 / 76

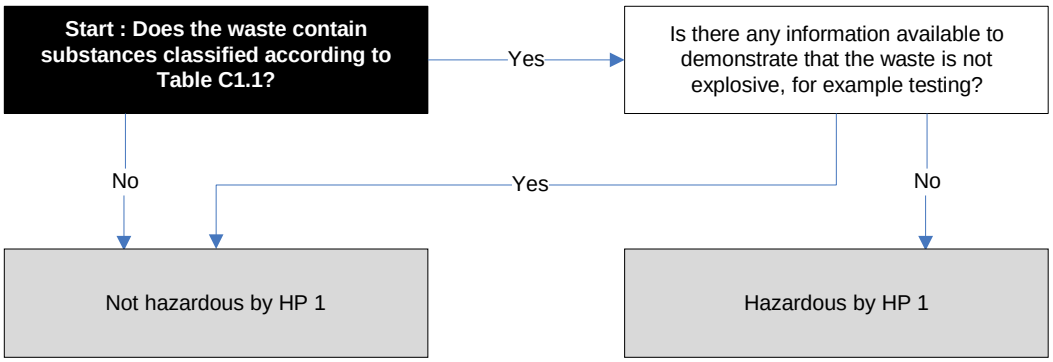
= 0.61%

This is above the available oxygen threshold of 0.5% for criteria (i), so HP 1 must be assessed.

Decision tree

Figure C1.1 sets out the assessment process for the Hazard HP 1.

Figure C1.1 | Decision tree for the assessment of Hazard HP 1



Test methods

Wastes containing substances listed in Table C1.1 should be tested for explosive properties in accordance with the European Chemical Agency's guidance on the application of the CLP Criteria. Separate sections are provided for testing of mixtures containing:

- organic peroxides (2.15)
- self reactive substances and mixtures (2.8), and
- explosives (2.1)

A waste containing an organic peroxide or a self reacting substance, where the waste is classified by testing as Type A (H240) or Type B (H241), displays the hazardous property HP 1 explosive. Where this is not the case, a waste classified as Type C, D, E or F (H242) displays the hazardous property HP 3 flammable.

A waste containing another substance listed in Table C1.1, where the waste is classified by testing as Unstable Explosive (H200), Division 1.1(H201), 1.2(H202), 1.3(H203) or 1.4(H204), displays the hazardous property HP 1 explosive.

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Appendix C:

C2 Assessment of Hazard HP 2: Oxidising

Definition

Annex III of the Waste Framework Directive defines HP 2 'Oxidizing' as:

'waste which may, generally by providing oxygen, cause or contribute to the combustion of other materials'

Concentration limits

A waste is assessed for HP using test methods, rather than concentration limits for substances. The WFD states that:

> 'When a waste contains one or more substances classified by one of the hazard class and category codes and hazard statement codes shown in Table 2 [C2.1], the waste shall be assessed for HP 2, where appropriate and proportionate, according to test methods. If the presence of a substance indicates that the waste is oxidising, it shall be classified as hazardous by HP 2.'

A waste containing substances that are classified with the hazard class, category and statement codes in Table C2.1 can be tested to show whether it displays that hazardous property or not. Alternatively a waste containing those substances can simply be assumed to be hazardous by HP 2.

Where the waste contains only one such substance, and that substance is assigned a specific concentration limit is given in Annex VI Table 3 to CLP, the waste can be assumed not be hazardous by HP 2 if the concentration of the oxidising substance is below that limit. For example nitric acid is listed in CLP as H272: Ox. Liq. 3, with a specific concentration limit of ≥ 65 %. Where nitric acid is present in a waste below 65% that waste will not be classified HP 2. If another oxidising substance is also present then this cannot be assumed.

Table C2.1 Hazard class and category code(s) and Hazard statement code(s) for waste constituents for the classification of wastes as hazardous by HP 2 Oxidising

Hazard class and category code(s)	Hazard statement code(s)	Description
Ox. Gas 1	H 270	May cause or intensify fire; oxidiser
Ox. Liq. 1	H 271	May cause fire or explosion; strong oxidiser
Ox. Sol. 1		
Ox. Liq. 2 Ox. Liq. 3	H 272	May intensify fire; oxidiser
Ox. Sol. 2 Ox. Sol. 3		

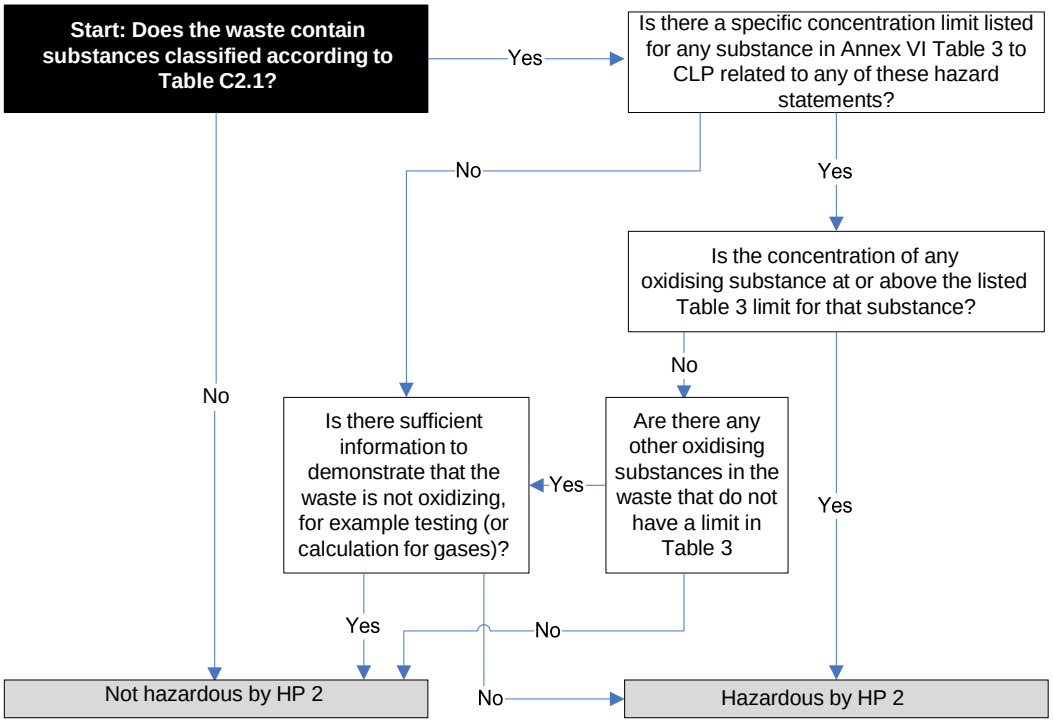
Calculation method for oxidising gases

Where a waste contains a substance assigned H270 it is possible to calculate whether or not the waste displays HP 2. The calculation method is provided by ISO 10156 (as amended) and should be applied in accordance with section 2.4 of the European Chemicals Agency guidance on the application of the CLP criteria.

Decision tree

Figure C2.1 sets out the assessment process for the Hazard HP 2.

Figure C2.1 | Decision tree for the assessment of Hazard HP 2



Test methods

Wastes containing substances listed in Table C2.1 should be tested oxidising properties in accordance with the European Chemical Agency's Guidance on the Application of the CLP Criteria. Separate sections are provided for testing of mixtures containing:

- oxidising gases (2.4)
- oxidising liquids (2.13), and
- oxidising solids (2.14)

A waste containing an oxidising substance, where the waste is classified by testing as H270, H271, or H272, displays the hazardous property HP 2 oxidising.

Appendix C:

C3 Assessment of Hazard HP 3: Flammable

Definition

Annex III of the Waste Framework Directive[2] (WFD) defines HP 3 'Flammable' over 6 indents:

- 'flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and ≤ 75°C;
- flammable pyrophoric liquid and solid waste: solid or liquid waste which, even in small quantities, is liable to ignite within five minutes after coming into contact with air;
- flammable solid waste: solid waste which is readily combustible or may cause or contribute to fire through friction;
- flammable gaseous waste: gaseous waste which is flammable in air at 20°C and a standard pressure of 101.3 kPa;
- water reactive waste: waste which, in contact with water, emits flammable gases in dangerous quantities;
- other flammable waste: flammable aerosols, flammable self-heating waste, flammable organic peroxides and flammable self-reactive waste.'

Concentration limits

A waste is assessed for HP 3 using test methods, rather than concentration limits for substances. The WFD states that:

> 'When a waste contains one or more substances classified by one of the following hazard class and category codes and hazard statement codes shown in Table 3 [see Table C3.1], the waste shall be assessed, where appropriate and proportionate, according to test methods. If the presence of a substance indicates that the waste is flammable, it shall be classified as hazardous by HP 3.'

A waste containing substances that are classified with the hazard class, category and statement codes in Table C3.1 can be tested to show whether it displays that hazardous property or not. Alternatively a waste containing those substances can simply be assumed to be hazardous by HP 3.

Where a waste contains substance assigned H260 or H261 it is possible to calculate the minimum amount of that substance that will give rise to HP 3 (fifth indent) – see page C11.

Where a waste contains substances assigned H220 or H221 it is possible to calculate whether or not the waste displays HP 3 (fourth indent). The calculation method is provided by ISO 10156 (as amended) and should be applied in accordance with section 2.2 of the European Chemicals Agency guidance on the application of the CLP criteria.

[2] Council Directive 2008/98/EC

Table C3.1 Hazard class and category code(s) and Hazard statement code(s) for waste constituents for the classification of wastes as hazardous by HP 3 Flammable

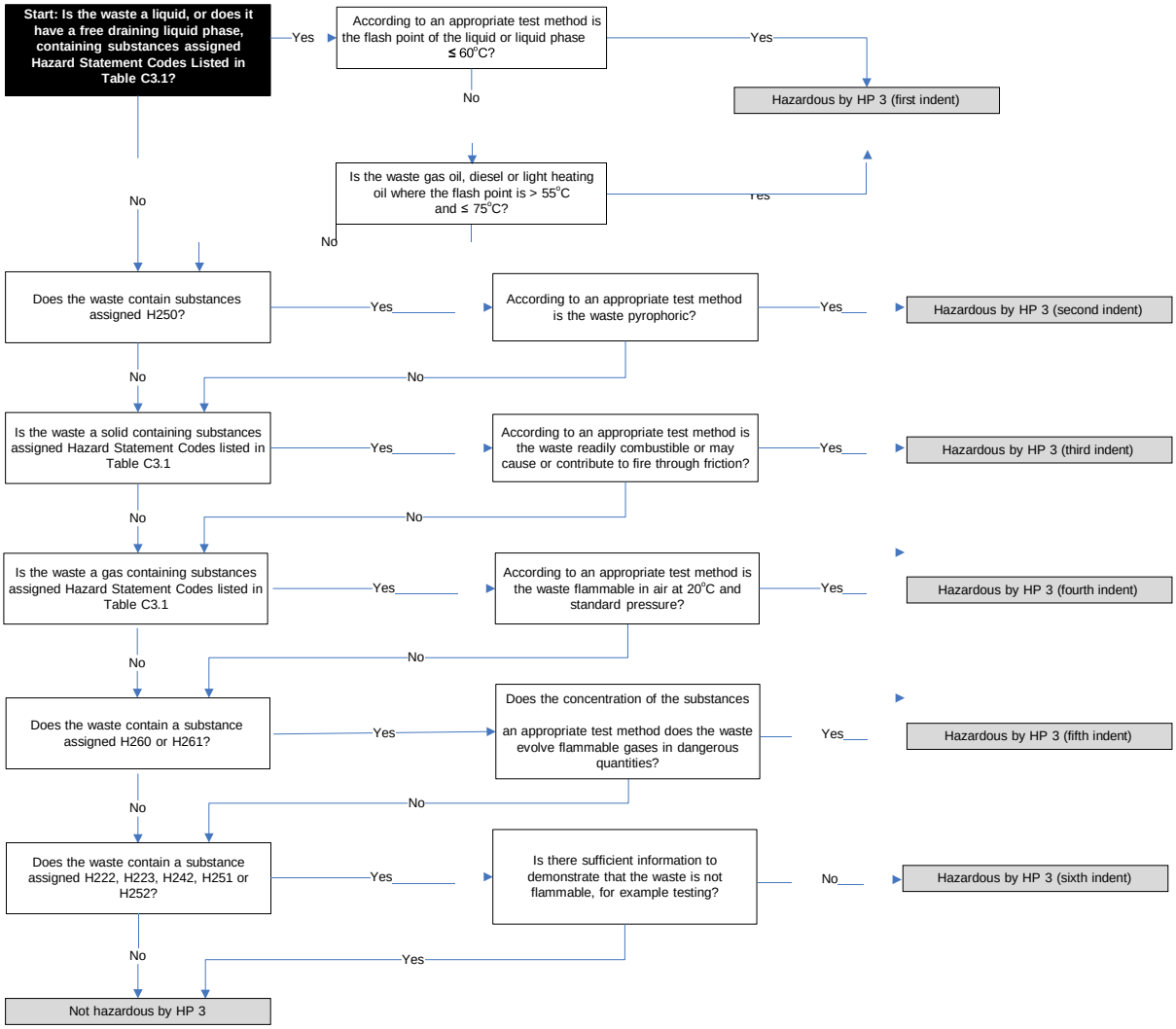
Hazard class and category code(s)	Hazard statement code(s)	Description
Flam. Gas 1	H220	Extremely flammable gas
Flam. Gas 2	H221	Flammable gas
Aerosol 1	H222	Extremely flammable aerosol
Aerosol 2	H223	Flammable aerosol
Flam. Liq. 1	H224	Extremely flammable liquid and vapour
Flam. Liq.2	H225	Highly flammable liquid and vapour
Flam. Liq. 3	H226	Flammable liquid and vapour
Flam. Sol. 1 Flam. Sol. 2	H228	Flammable solid
Self-react. CD Self-react. EF Org. Perox. CD Org. Perox. EF	H242	Heating may cause a fire
Pyr. Liq. 1 Pyr. Sol. 1	H250	Catches fire spontaneously if exposed to air
Self-heat.1	H251	Self-heating: may catch fire
Self-heat. 2	H252	Self-heating in large quantities; may catch fire
Water-react. 1	H260	In contact with water releases flammable gases which may ignite spontaneously
Water-react. 2 Water-react. 3	H261	In contact with water releases flammable gases

Note: a waste containing self-reactive substances or organic peroxides classified as H240 or H241 may possess the hazardous property HP 3 Flammable as a result of the assessment of HP 1 Explosive classifying the waste as a whole as H242.

Decision tree

Figure C3.1 sets out the assessment process for the Hazard HP 3.

Figure C3.1 | Decision tree for the assessment of Hazard HP 3



Note:

- a sludge (without a liquid phase) should be considered as a solid for testing purposes
- the separate elements of a solid waste that contains a freely draining liquid phase, for example a toluene impregnated soil, should both be tested for flammability
- a free draining liquid will include liquids that can be poured or decanted from a waste, or the liquid easily extracted from absorbents/rags by simple physical or mechanical means

Calculation method for Hazard HP 3 (fifth indent)

A substance is assigned H260 or H261 if it is capable of releasing a highly flammable gas[3] at a rate in excess of 1 litre of gas per kilogram of substance per hour when water is added.

If a waste contains a substance assigned H260 or H261, it is possible to calculate the limiting concentration of the substance in the waste that would make it hazardous by HP 3 (fifth indent).

[3] A highly flammable gas is assigned H220 or H221. The gases that are likely to be released include hydrogen, ethane, ethyne and phosphine.

Below this concentration the waste will not be hazardous as a result of HP 3 (fifth indent). At or above the concentration the waste should be assumed to be HP 3, or tested.

An example of how to do the calculation is given below in Box C3.1.

Box C3.1	Calculation method for Hazard HP 3 Flammable (fifth indent)

1. Write a balanced equation for the reaction that produces the gas. The general form of this equation should be as follows:

$$rR + wW \rightarrow pP + gG$$

where R is the H260/H261 substance, W is water, P is a product of the reaction, and G is the gas released; r, w, p and g are the stoichiometric ratios that balance the equation.

2. Attribute molecular weights and stoichiometric ratios to the substances in the equation.

3. Divide (r x molar weight of R) by (g x 22.4). This gives the mass of R that will evolve 1 litre of gas. 1 mol of gas occupies 22.4 litres at standard temperature and pressure.

4. Divide this amount (in grams) by 1,000 (to convert to kilograms) and multiply it by 100 to give a percentage by weight, and thus the limiting concentration for HP 3 (fifth indent) of substance R.

Example calculation: A waste contains aluminium carbide. Aluminium carbide is a H260 substance which reacts with water to give methane gas.

Al_4C_3	+	$6H_2O$	→	$2Al_2O_3$	+	$3CH_4$
aluminium carbide		water		aluminium oxide		methane
144 g		18 g		102 g		16 g
1 mol		6 mol		2 mol		3 mol

r = 1 mol of Al_4C_3, R = 144 g; g = 3 mol CH_4.

Limiting concentration of aluminium carbide in waste = [144 / (3x22.4)] / 1,000 x 100,

which is 0.21% (approximately 0.2%).

Threshold limits derived from the calculation for some H260 and H261 substances are given in Table C3.2.

Table C3.2	Examples of substances which may cause a waste to exhibit HP 3 Flammable (fifth indent) and their threshold concentrations (note; this is not a complete list of such substances)

Substance name	Hazard statement codes associated with HP3 (fifth indent)	Equation	Concentration limit for waste to be H3-A (fifth indent) (%)[1]
Lithium	H260	$2Li + 2H_2O \rightarrow 2LiOH + H_2$	0.1
Sodium	H260	$2Na + 2H_2O \rightarrow 2NaOH + H_2$	0.2
Magnesium powder (pyrophoric)	H261	$Mg + 2H_2O \rightarrow Mg(OH)_2 + H_2$	0.1
Aluminium powder (pyrophoric) Aluminium powder (stabilised)	H261	$2Al + 6H_2O \rightarrow 2Al(OH)_3 + 3H_2$	0.1
Potassium	H260	$2K + 2H_2O \rightarrow 2KOH + H_2$	0.4
Calcium	H261	$Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$	0.2
Zinc powder / zinc dust (pyrophoric)	H260	$Zn + 2H2O \rightarrow Zn(OH)_2 + H_2$	0.3
Zirconium powder (pyrophoric)	H260	$Zr + 4H_2O \rightarrow Zr(OH)_4 + 2H_2$	0.2
Aluminium carbide	H260	$Al_4C_3 + 6H_2O \rightarrow 2Al_2O_3 + 3CH_4$	0.2
Lithium aluminium hydride	H260	$LiAlH_4 + H_2O \rightarrow LiAl(OH)_2 + 4H_2$	0.1
Sodium hydride	H260	$NaH + H_2O \rightarrow NaOH + H_2$	0.1
Calcium hydride	H260	$CaH_2 + 2H_2O \rightarrow Ca(OH)_2 + 2H_2$	0.1
Calcium carbide	H260	$CaC_2 + H_2O \rightarrow Ca(OH)_2 + C_2H_2$	0.3
Calcium phosphide	H260	$Ca_3P_2 + 6H_2O \rightarrow$ $2PH_3 + 3Ca(OH)_2$	0.4
Aluminium phosphide	H260	$AlP + 3H_2O \rightarrow PH_3 + Al(OH)_3$	0.3
Magnesium phosphide	H260	$Mg_3P_2 + 6H_2O \rightarrow$ $2PH_3 + 3Mg(OH)_2$	0.3
Trizinc diphosphide	H260	$Zn_3P_2 + 6H_2O \rightarrow$ $2PH_3 + 3Zn(OH)_2$	0.6
Diethyl (ethyldimethyl-silanolato) aluminium	H260	$(C_2H_5)_2Si(CH_3)_2C_2H_5Al + 2H_2O \rightarrow$ $2C_2H_6 + Al(OH)_2Si(CH_3)_2C_2H_5$	0.4

Notes:

[1] Rounded to one decimal place.

Test methods

Wastes containing substances listed in Table C3.1 should be tested for flammable properties in accordance with the European Chemical Agency's Guidance on the Application of the CLP Criteria. Separate sections are provided for testing of mixtures containing:

- flammable gases (2.2)
- aerosols (2.3)
- flammable liquids (2.6)
- flammable solids (2.7)
- self-reactive substances and mixtures (2.8)
- pyrophoric liquids (2.9)
- pyrophoric solids (2.10)
- self-heating substances and mixtures (2.11)
- water reactive substances (2.12)
- organic peroxides (2.15)

A waste possesses the hazardous property HP 3 where testing indicates that the waste displays one or more of the hazard statements listed in Table C3.1.

Appendix C:

C4 Assessment of Hazard HP 4: Irritant – skin irritation and eye damage

Definition

Annex III of the Waste Framework Directive defines HP 4 'Irritant' as:

'waste which on application can cause skin irritation or damage to the eye'

Hazards HP 4 and HP 8 are linked because they refer to the potential for harm or damage to tissue at different levels of severity. See C8 for further details.

Hazardous wastes containing irritant substances will only display irritant properties. Hazardous wastes containing corrosive substances can display either corrosive or irritant properties dependent upon concentration.

The mechanical irritation produced by some substances, for example mineral wool, is not included within the definition of HP 4.

Concentration limits

The WFD states that:

> 'When a waste contains one or more substances in concentrations above the cut-off value, that are classified by one of the following hazard class and category codes and hazard statement codes and one or more of the following concentration limits is exceeded or equalled, the waste shall be classified as hazardous by HP 4.
>
> The cut-off value for consideration in an assessment for Skin corr. 1A (H314), Skin irrit. 2 (H315), Eye dam. 1 (H318) and Eye irrit. 2 (H319) is 1%.
>
> If the sum of the concentrations of all substances classified as Skin corr. 1A (H314) exceeds or equals 1%, the waste shall be classified as hazardous according to HP 4.
>
> If the sum of the concentrations of all substances classified as H318 exceeds or equals 10%, the waste shall be classified as hazardous according to HP 4.
>
> If the sum of the concentrations of all substances classified H315 and H319 exceeds or equals 20%, the waste shall be classified as hazardous according to HP 4.
>
> Note that wastes containing substances classified as H314 (Skin corr.1A, 1B or 1C) in amounts greater than or equal to 5% will be classified as hazardous by HP 8. HP 4 will not apply if the waste is classified as HP 8.'

This is set out in Table C4.1.

Table C4.1	Hazard class and category code(s) and Hazard statement code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 4

Hazard class and category code(s)	Hazard statement code(s)	Description	Concentration limit (total of substances)
Skin Corr. 1A	H314	Causes severe skin burns and eye damage	≥1% and <5%
Eye Dam. 1	H318	Causes serious eye damage	≥ 10%
Skin irrit. 2 and Eye irrit. 2	H315 and H319	Causes skin irritation and Causes serious eye irritation	≥ 20%

Where a waste contains a substance that is H314 Skin Corr.1A, 1B or 1C at a concentration ≥ 5% see also HP 8 Corrosive (chapter C8 of this document).

The concentration limits are applied to the known components of a waste. But it can be difficult to identify all the substances present in some wastes. Where the waste is not Irritant as a result of the known components, but some components remain unknown, pH should be used to assess the waste as a whole.

A waste with a pH ≤ 2 or ≥ 11.5 should be considered HP 8 Corrosive unless both:

- an acid or alkali reserve test suggests that the classification as Corrosive is not warranted, **and**
- further in vitro testing has confirmed that classification (as Irritant or neither Irritant/Corrosive)

The acid or alkali reserve test measures the buffering capacity of the waste. If the buffer capacity is low an in vitro test may be used to determine the classification as Irritant, Corrosive, or neither.

A low buffering capacity is where:

- pH + 1/12 alkaline reserve < 14.5
- or pH - 1/12 acid reserve > -0.5.

If the buffering capacity is ≥ 14.5 or ≤ -0.5 the mixture is Corrosive.

The acid/alkali reserve alone should not be used to exonerate waste from classification as Corrosive or Irritant. This means that the result of an acid or alkali reserve test cannot be used to conclude that a waste is not irritant or corrosive. An additional in vitro test is required.

Note, the:

- pH and acid/alkali reserve test assumes that any potential irritancy / corrosivity is caused by ionic substances. Where this is not the case, for example if non-ionic substances are involved, the pH and acid/alkali reserve method cannot be used. Further analysis of the substances present and their concentration should be used instead.
- in vitro test(s) selected must be appropriate for the nature of the waste and address both Irritancy and Corrosivity

Cut-off values

The following cut-off values apply to the assessment:

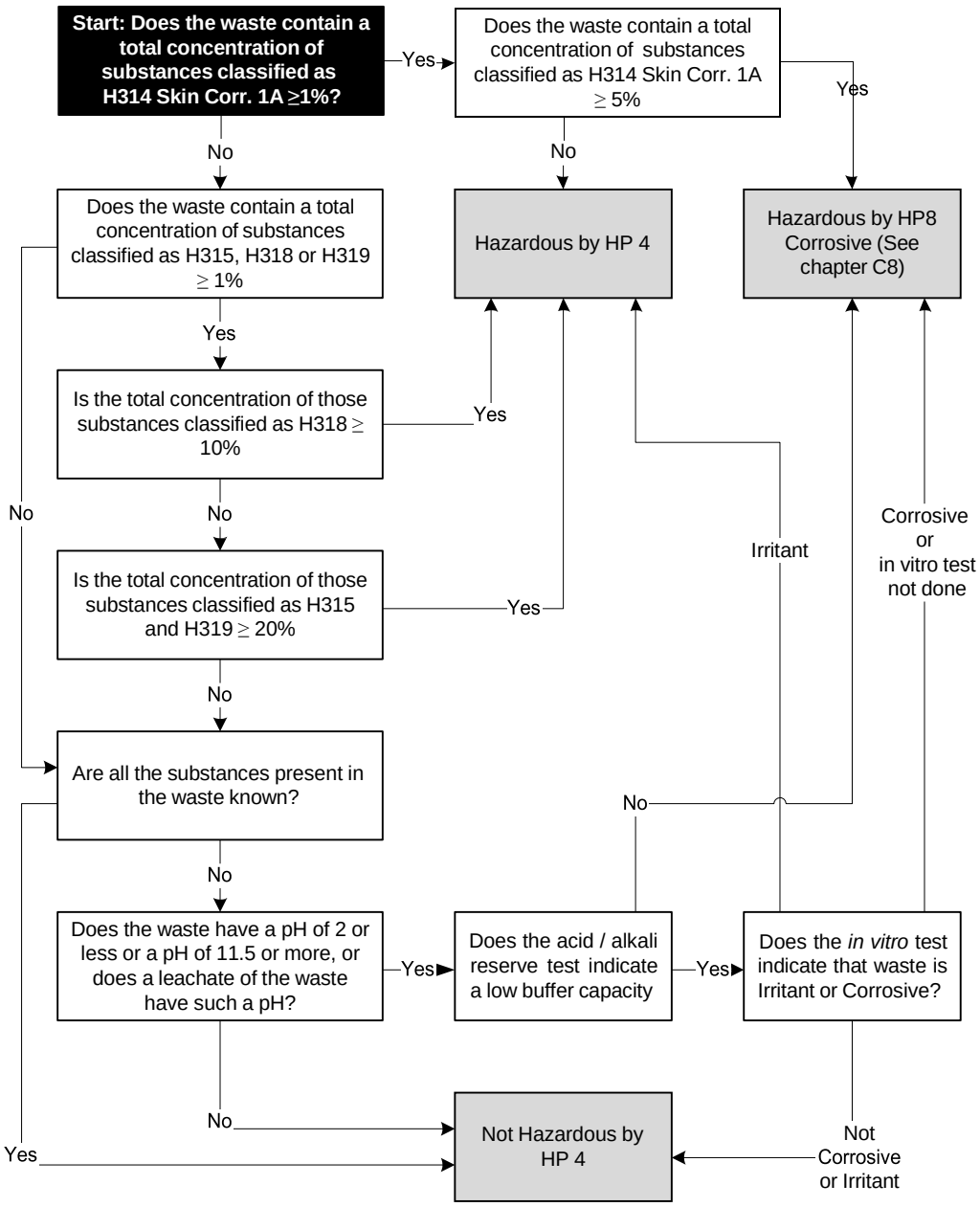
- for H314, H315, H318 and H319 the cut off value is 1%.

An individual substance present at a concentration below this cut off value is not included in the total concentrations given in Table C4.1 and Figure C4.1.

Decision tree

Figure C4.1 sets out the assessment process for Hazards HP 4.

Figure C4.1 | Decision tree for the assessment of Hazard HP 4 Irritant



Test methods

A HP 4 assessment of a waste will be based on the identification of the individual substances in the waste, their classification, and reference to concentration limits in Annex III of the WFD.

Where this is not possible, waste containing substances listed in Table C4.1 should be tested for irritant properties in accordance with the section 3.2 of the European Chemical Agency's Guidance on the Application of the CLP Criteria. A mixture assigned H315, H318 or H319 by this assessment is HP 4 Irritant.

Test methods should only be considered where indicated by that guidance.

The test methods that rely on animal testing, given in Council Regulation 440/2008, are not appropriate. Validated alternative tests are available from the European Union Reference Laboratory for alternatives to animal testing[4].

An example of application of the acid alkali reserve and in-vitro test

A waste management process produces a filtercake.

The filtercake is known to contain certain metal hydroxides, at a concentration insufficient for an Irritant classification, but the full chemical composition is not known. The presence of other irritant or corrosive substances cannot be ruled out.

Sampling of that filtercake in accordance with Appendix D identifies that the pH varies from 11.6 to 13.1.

The process operator has three options at this point:

- determine the full chemical composition (i.e. identify all chemical compounds present)
- classify the waste as Corrosive, or
- undertake both acid/alkali reserve and in-vitro testing

Due to the difficulties in determining the full chemical composition the operator wants to use acid/alkali reserve and in-vitro testing.

The operator can demonstrate that pre-acceptance procedures reliably identify and exclude wastes containing non-ionic irritant or corrosive substances, and these are not produced by their treatment process. As these substances are known not to be present in the filtercake, acid/alkali reserve can be considered.

To avoid the need to test every sample using both methods routinely the operator undertakes a basic characterisation of the filtercake where:

- a representative number of samples are taken (see Appendix D for how to determine this)
- that cover the full range of compositional and pH parameters
- each sample is analysed by both acid/alkali reserve, and in-vitro tests
- the specific in vitro test was chosen on the basis of suitability for testing this waste

As a result of this exercise the operator demonstrates for routine operational use that:

- for the range of compositional and pH parameters tested
- the in-vitro method gives an Irritant answer
- the acid-alkali reserve test alone can therefore be relied upon for routine use, and
- only batches of waste and samples that fall outside of the compositional and pH parameters of the basic characterisation would require additional in-vitro testing

[4] http://ihcp.jrc.ec.europa.eu/our_labs/eurl-ecvam.

Appendix C:

C5 Assessment of Hazards HP 5: Specific Target Organ Toxicity (STOT) / Aspiration Toxicity

Definition

Annex III of the Waste Framework Directive defines HP 5 'Harmful' as:

'waste which can cause specific target organ toxicity either from a single or repeated exposure, or which cause acute toxic effects following aspiration'

Concentration limits

The WFD states that:

> 'When a waste contains one or more substances classified by one or more of the following hazard class and category codes and hazard statement codes shown in Table 4, and one or more of the concentration limits in Table 4 [see Table C5.1] is exceeded or equalled, the waste shall be classified as hazardous according to HP 5. When substances classified as STOT are present in a waste, an individual substance has to be present at or above the concentration limit for the waste to be classified as hazardous by HP 5.
>
> When a waste contains one or more substances classified as Asp. Tox. 1 and the sum of those substances exceeds or equals the concentration limit, the waste shall be classified as hazardous by HP 5 only where the overall kinematic viscosity (at 40°C) does not exceed 20.5 mm²/s.[5]'

Cut-off values

No cut-off values apply to this assessment.

Table C5.1 Hazard class and category code(s) and Hazard statement code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 5 STOT/ Asp. Tox.

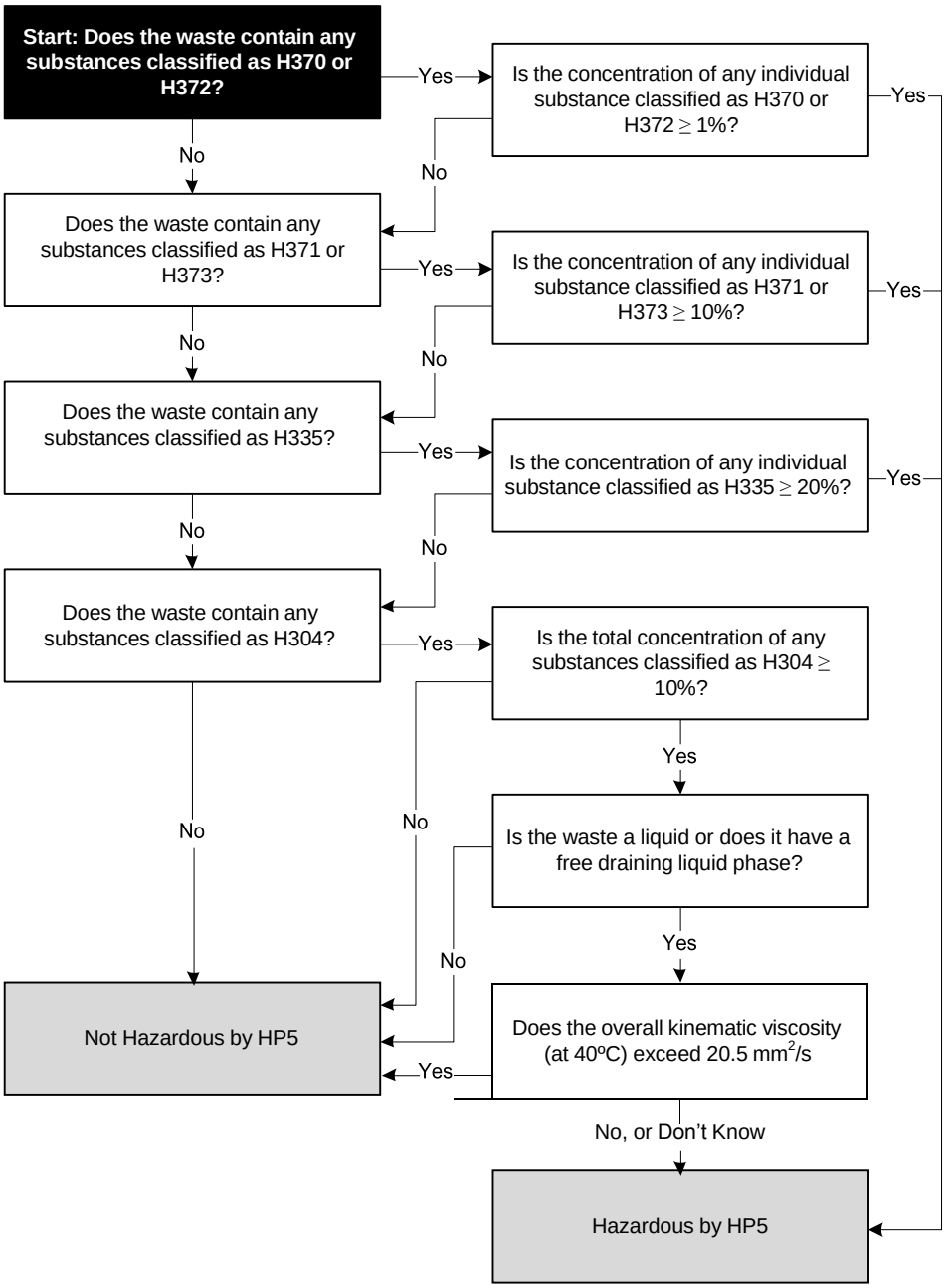
Hazard class and category code(s)	Hazard statement code(s)	Description	Concentration limit
STOT SE 1	H370	Causes damage to organs	≥ 1% (Indiv.)
STOT SE 2	H371	May cause damage to organs	≥ 10% (Indiv.)
STOT SE 3	H335	May cause respiratory irritation	≥ 20% (Indiv.)
STOT RE 1	H372	Causes damage to organs through prolonged or repeated exposure	≥ 1% (Indiv.)
STOT RE 2	H373	May cause damage to organs through prolonged or repeated exposure	≥ 10% (Indiv.)
Asp. Tox. 1	H304	May be fatal if swallowed and enters airways	≥ 10%(total)

[5] The kinematic viscosity shall only be determined for fluids.

Decision tree

Figure C5.1 sets out the assessment process for the Hazard HP 5.

Figure C5.1 | Decision tree for the assessment of Hazard HP 5 STOT / Aspiration Toxicity



Test methods

A HP 5 assessment of a waste will be based on the identification of the individual substances in the waste, their classification, and reference to concentration limits.

Where this is not possible, waste containing substances listed in Table C5.1 should be assessed for specific target organ toxicity and aspiration toxicity properties in accordance with the section 3.8 of the European Chemical Agency's guidance on the application of the CLP criteria.

Test methods should only be considered where indicated by that guidance.

The test methods that rely on animal testing, given in Council Regulation 440/2008, are not appropriate. Validated alternative tests are available from the European Union Reference Laboratory for alternatives to animal testing[6].

[6] http://ihcp.jrc.ec.europa.eu/our_labs/eurl-ecvam.

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Appendix C:

C6 Assessment of Hazard HP 6: Acute Toxicity

Definition

Annex III of the Waste Framework Directive defines HP 6 'Acute Toxicity' as:

'waste which can cause acute toxic effects following oral or dermal administration, or inhalation exposure'.

Concentration limits

The WFD states that:

> 'If the sum of the concentrations of all substances contained in a waste, classified with an acute toxic hazard class and category code and hazard statement code given in Table 5 [see Table C6.1], exceeds or equals the threshold given in that table, the waste shall be classified as hazardous by HP 6. When more than one substance classified as acute toxic is present in a waste, the sum of the concentrations is required only for substances within the same hazard category.'

Cut-off values

The following cut-off values apply to the assessment:

- For H300, H310, H330, H301, H311, and H331 : 0.1%;
- For H302, H312, H332: 1%.

An individual substances present at a concentration below the cut off, for a hazard statement code assigned to it, is not included in the sum of the concentrations for that hazard class and category code.

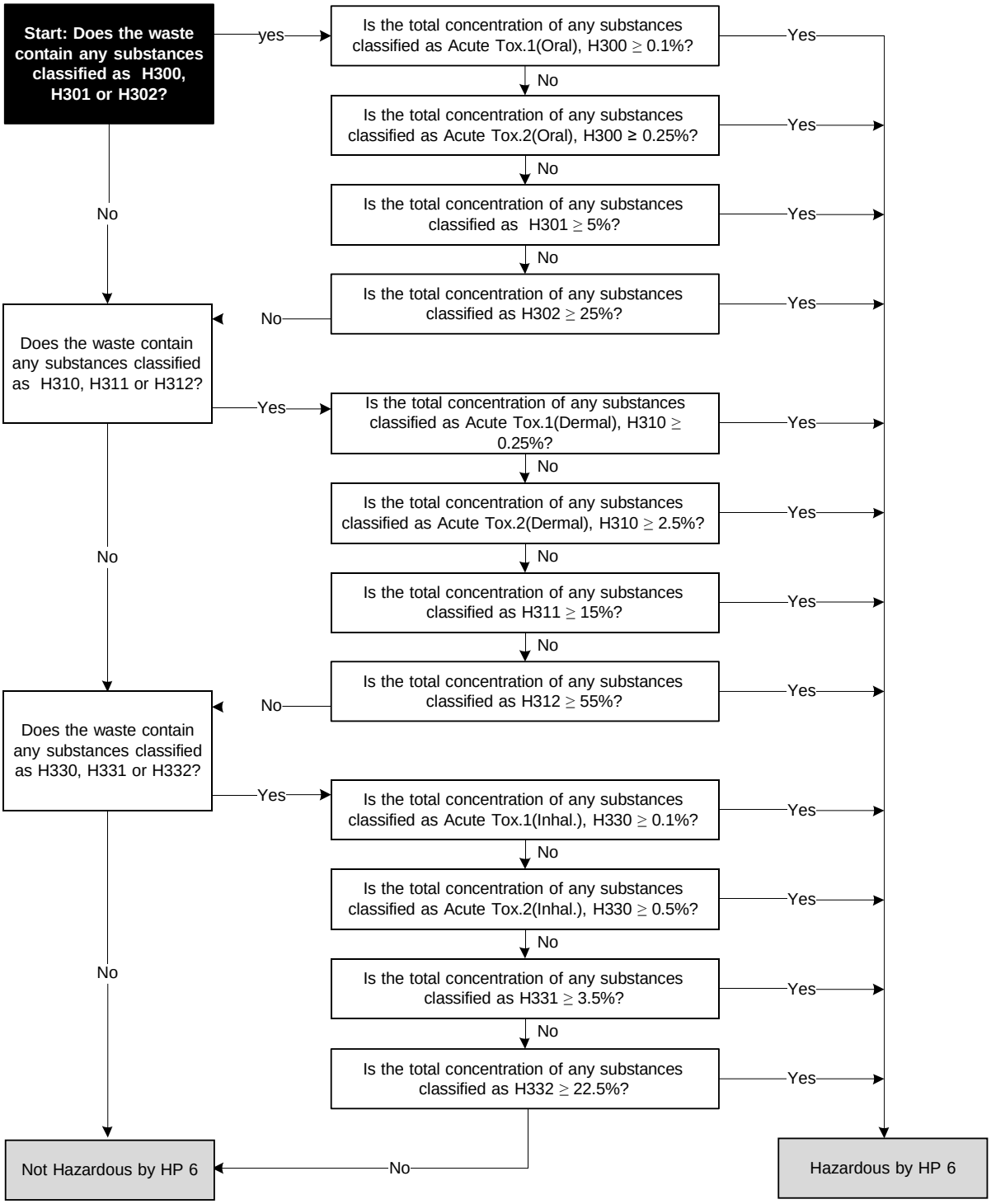
Table C6.1 Hazard class and category code(s) and Hazard statement code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 6 Acute Toxicity

Hazard class and category code(s)	Hazard statement code(s)	Description	Concentration limit (sum of substances)
Acute Tox.1 (Oral)	H300	Fatal if swallowed	≥ 0.1%
Acute Tox. 2 (Oral)	H300	Fatal if swallowed	≥ 0.25%
Acute Tox. 3 (Oral)	H301	Toxic if swallowed	≥ 5%
Acute Tox.4 (Oral)	H302	Harmful if swallowed	≥ 25%
Acute Tox.1 (Dermal)	H310	Fatal in contact with skin	≥ 0.25%
Acute Tox.2 (Dermal)	H310	Fatal in contact with skin	≥ 2.5%
Acute Tox.3 (Dermal)	H311	Toxic in contact with skin	≥ 15%
Acute Tox. 4 (Dermal)	H312	Harmful in contact with skin	≥ 55%
Acute Tox.1 (Inhal.)	H330	Fatal if inhaled	≥ 0.1%
Acute Tox.2 (Inhal.)	H330	Fatal if inhaled	≥ 0.5%
Acute Tox. 3 (Inhal.)	H331	Toxic if inhaled	≥ 3.5%
Acute Tox. 4 (Inhal.)	H332	Harmful if inhaled	≥ 22.5%

Decision tree

Figure C6.1 sets out the assessment process for the Hazard HP 6.

Figure C6.1 | Decision tree for the assessment of Hazard HP 6 Acute Toxicity



Test methods

A HP 6 assessment of a waste will be based on the identification of the individual substances in the waste, their classification, and reference to concentration limits.

Where this is not possible, waste containing substances listed in Table C6.1 should be assessed for acute toxicity properties in accordance with the section 3.1 of the European Chemical Agency's guidance on the application of the CLP criteria.

Test methods should only be considered where indicated by that guidance.

The test methods that rely on animal testing, given in Council Regulation 440/2008, are not appropriate. Validated alternative tests are available from the European Union Reference Laboratory for alternatives to animal testing[7].

[7] http://ihcp.jrc.ec.europa.eu/our_labs/eurl-ecvam.

Appendix C:

C7 Assessment of Hazard HP 7: Carcinogenic

Definition

Annex III of the Waste Framework Directive defines HP 7 'Carcinogenic' as:

'waste which induces cancer or increases its incidence'

Limiting concentration The WFD states that:

> 'When a waste contains a substance classified by one of the following hazard class and category codes and hazard statement codes and exceeds or equals one of the following concentration limits shown in Table 6 [see Table C7.1], the waste shall be classified as hazardous by HP 7. When more than one substance classified as carcinogenic is present in a waste, an individual substance has to be present at or above the concentration limit for the waste to be classified as hazardous by HP 7.'

Cut-off values

No cut-off values apply to this assessment.

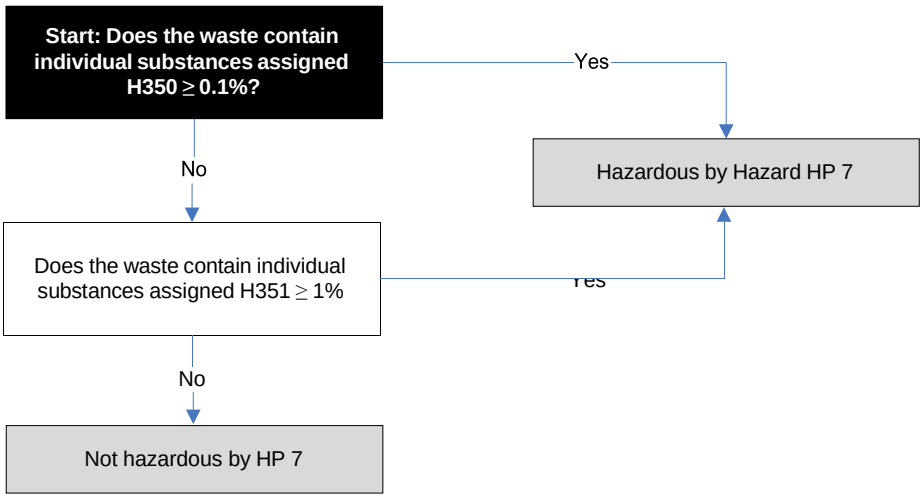
Table C7.1 Hazard class and category code(s) and Hazard statement code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 7 Carcinogenic

Hazard class and category code(s)	Hazard statement code(s)	Description	Concentration limit (Individual substance)
Carc. 1A	H350	May cause cancer	≥ 0.1%
Carc. 1B			
Carc. 2	H351	Suspected of causing cancer	≥ 1.0%

Decision tree

Figure C7.1 sets out the assessment process for the Hazard HP 7.

Figure C7.1 | Decision tree for the assessment of Hazard HP 7 Carcinogenic



Test methods

A HP 7 assessment of a waste will be based on the identification of the individual substances in the waste, their classification, and reference to concentration limits.

Where this is not possible, waste containing substances listed in Table C7.1 should be assessed for carcinogenic properties in accordance with the section 3.6 of the European Chemical Agency's guidance on the application of the CLP criteria.

Test methods should only be considered where indicated by that guidance.

The test methods that rely on animal testing, given in Council Regulation 440/2008, are not appropriate. Validated alternative tests are available from the European Union Reference Laboratory for alternatives to animal testing[8].

[8] http://ihcp.jrc.ec.europa.eu/our_labs/eurl-ecvam.

Appendix C:

C8 Assessment of Hazard HP 8: Corrosive

Definition

Annex III of the Waste Framework Directive defines HP 8 'Corrosive' as:

'waste which on application can cause skin corrosion'

Hazards HP 8 and HP 4 are linked because they refer to the potential for harm or damage to tissue at different levels of severity. See C4 for further details.

Limiting concentration

The WFD states that:

> 'When a waste contains one or more substances classified as Skin corr.1A, 1B or 1C (H314) and the sum of their concentrations exceeds or equals 5%, the waste shall be classified as hazardous by HP 8.'

This is set out in Table C8.1

Table C8.1 Hazard class and category code(s) and Hazard statement code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 8 Corrosive

Hazard class and category code(s)	Hazard statement code(s)	Description	Concentration limit (Sum of substances)
Skin corr. 1A, 1B, or 1C	H314	Causes severe skin burns and eye damage	≥ 5%

Where a waste contains a substance that is H314 Skin Corr.1A at a concentration ≥ 1% and ≤ 5%see also HP 4 Irritant (chapter C4 of this document).

The concentration limits are applied to the known components of a waste – but it can be difficult to identify all the substances present in some wastes. Where the waste is not Corrosive as a result of the known components, but some components remain unknown, pH should be used to assess the waste as a whole.

A waste with a pH ≤ 2 or ≥ 11.5 should be considered HP 8 Corrosive unless both:

- an acid or alkali reserve test suggests that the classification as Corrosive is not warranted, **and**
- further in vitro testing has confirmed that classification (as Irritant or neither Irritant/Corrosive)

Further information on this assessment is provided in Appendix C4 Assessment of Hazard HP4 Irritant.

Cut-off values

The following cut-off values apply to the assessment:

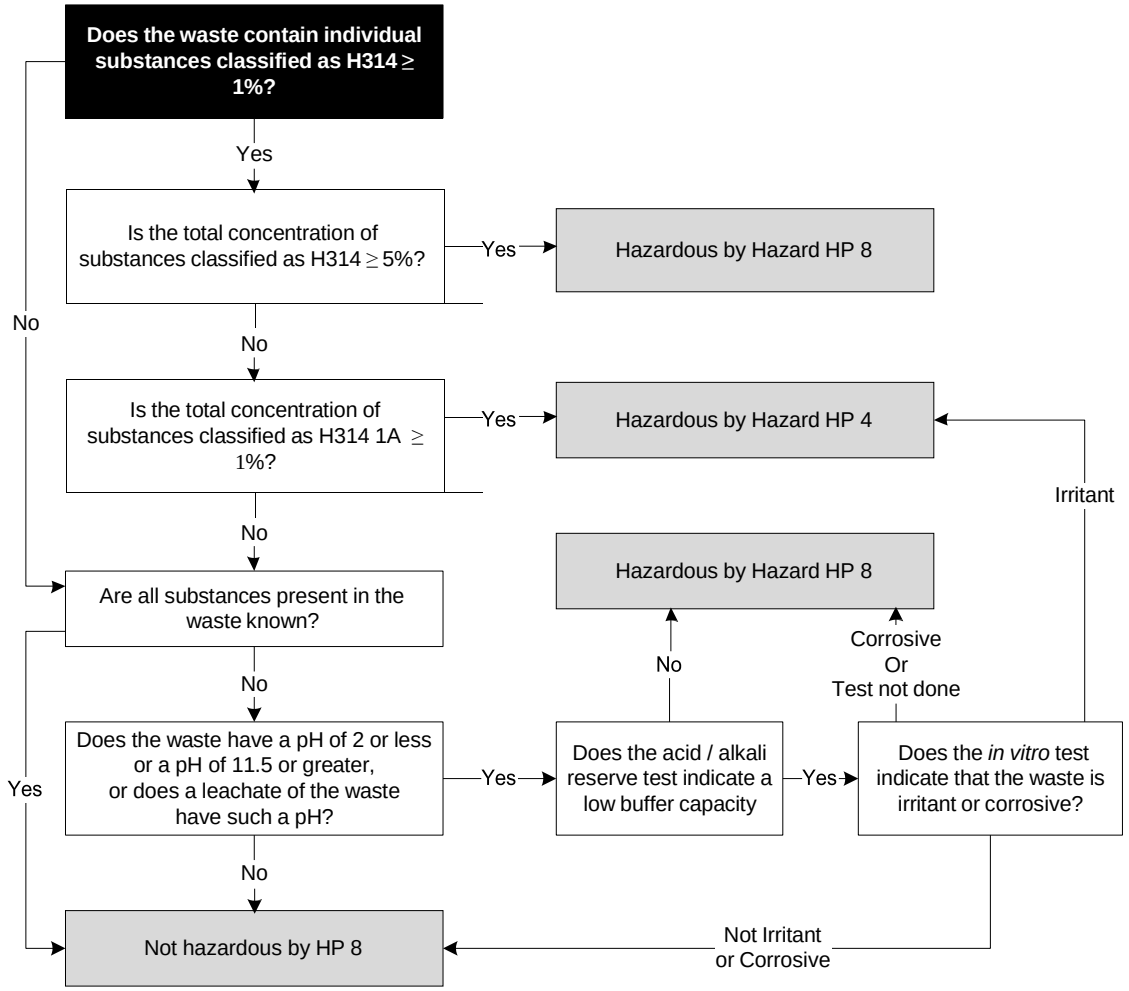
- for H314 : 1%

An individual substance present at a concentration below this cut off value is not included in the sum of the concentrations for H314.

Decision tree

Figure C8.1 sets out the assessment process for Hazards HP 8.

Figure C8.1 | Decision tree for the assessment of Hazard HP 8 Corrosive



C8.5 Test methods

A HP 8 assessment of a waste will be based on the identification of the individual substances in the waste, their classification, and reference to concentration limits in Annex III of the WFD,

Where this is not possible, waste containing substances listed in Table C8.1 should be assessed for corrosive and irritant properties in accordance with the section 3.2 of the European Chemical Agency's guidance on the application of the CLP criteria.

A mixture assigned H314 by this assessment is HP 8 Corrosive.

Test methods should only be considered where indicated by that guidance.

The test methods that rely on animal testing, given in Council Regulation 440/2008, are not appropriate. Validated alternative tests are available from the European Union Reference Laboratory for alternatives to animal testing[9].

[9] http://ihcp.jrc.ec.europa.eu/our_labs/eurl-ecvam.

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Appendix C:

C9 Assessment of Hazard HP 9: Infectious

Definition

Annex III of the Waste Framework Directive defines HP 9 'Infectious' as:

'waste containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms.'

Concentration limit

A waste isn't assessed for HP 9 with reference to limiting concentrations of chemical substances. The WFD states that:

> 'The attribution of HP 9 shall be assessed by the rules laid down in reference documents or legislation in the Member States.'

The assessment of HP 9 relies on understanding the terms in the definition:

'micro-organisms' - a microbiological entity, cellular or non-cellular, capable of replication or of transferring genetic material (includes algae, bacteria, fungi, parasites, plasmids, prions, viruses, rickettsia, and genetically modified variants thereof);

'viable' - micro-organisms that have been killed are not considered infectious. Viability relates solely to the state of the organism at the point and time of the production of the waste;

'or their toxins' - toxins produced by micro-organisms which can render the waste 'infectious' even if the producing organism is no longer present;

'cause disease' - this includes any disease regardless of severity;

'man or other living organisms' – the List of Waste provides sub-chapters for human and animal healthcare only so we will restrict the extent of infection accordingly to humans and animals.

'reference documents' – is a reference to this document.

Toxins from micro-organisms are assessed, in the same manner as chemical substances, by considering the hazardous statement codes assigned to them and associated hazardous properties.

There are no hazardous statement codes for other 'infectious' agents and they are not considered as 'hazardous substances'.

There are two types of assessment:

- mirror entry wastes will be assigned HP 9 if they contain a toxin produced by a micro-organism in high enough concentration for the waste to display Specific Target Organ Toxicity (HP 5) or Acutely Toxic (HP 6) properties. Wastes that might be infectious due to microbial toxins include dredgings or skimmings from a watercourse where a cyanobacterial bloom has occurred.
- identifying whether relevant healthcare wastes, being associated with 'infection', are classified as 'infectious'.

Relevant healthcare wastes

The entries in the List of Waste that are linked to HP 9 are:

18 01	**wastes from natal care, diagnosis, treatment or prevention of disease in humans**	
18 01 03*	wastes whose collection and disposal is subject to special requirements in order to prevent infection	AH
18 02	**wastes from research, diagnosis, treatment or prevention of disease involving animals**	
18 02 02*	wastes whose collection and disposal is subject to special requirements in order to prevent infection	AH

The List of Waste entries 18 01 03* and 18 02 02* are absolute hazardous and apply to healthcare waste where they are '*subject to special requirements in order to prevent infection*'.

The linked non-hazardous healthcare waste entries are:

18 01	**wastes from natal care, diagnosis, treatment or prevention of disease in humans**	
18 01 04	wastes whose collection and disposal is not subject to special requirements in order to prevent infection (for example dressings, plaster casts, linen, disposable clothing, diapers)	AN
18 02	**wastes from research, diagnosis, treatment or prevention of disease involving animals**	
18 02 03	wastes whose collection and disposal is not subject to special requirements in order to prevent infection	AN

18 01 04 and 18 02 03 are absolute non-hazardous entries, linked to 18 01 03* and 18 02 02*, in that if a healthcare waste is not 'subject to special requirements in order to prevent infection' it takes the non-hazardous List of Waste entry.

The key to the assessment of infectious for healthcare wastes is to determine the meaning of 'special requirements'. Special requirements apply when:

- the source person or animal (the patient), is known or suspected to have a disease / infection caused by a micro-organism or its toxin **and** the waste is likely to contain the viable infectious agent or toxin; or
- the waste is, or is contaminated with, a culture or an enrichment of a micro-organism or its toxin that may cause disease in man or other living animals; or
- the waste may cause infection to any person or animal coming into contact with it.

Special requirements should be determined by clinical assessment of each waste item and patient, as follows:

- clinical assessment should be carried out by a healthcare professional who is familiar with the type of waste generated, the current medical condition and, where feasible, the past medical history of the patient
- it is unlikely that it will always be practical, or possible, to identify specific pathogens or toxins within the waste when a patient first presents symptoms as definitive laboratory identification requires time to undertake. The procedure for determining whether a waste is considered hazardous by HP 9 must therefore, where this is the case, assume that the disease causing agent has not been confirmed and should be based on clinical assessment of whether an unidentified infection of any type is suspected or known.
- all pathogens and microbial toxins should be included in the assessment. HP 9 does not consider the severity of the disease

Waste classified as infectious should be kept segregated from non-infectious waste so that they do not become contaminated.

For more details of the determination of a healthcare waste as infectious refer to Department of Health guidance 'Safe management of healthcare waste'[10].

Test methods

Laboratory identification is generally not required to assess the waste for HP 9. There are no test methods given in Council Regulation 440/2008.

[10] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/167976/HTM_07-01_Final.pdf

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Appendix C:

C10 Assessment of Hazard HP 10: Toxic for reproduction

Definition

Annex III of the Waste Framework Directive defines HP 10 'Toxic for reproduction' as:

'waste which has adverse effects on sexual function and fertility in adult males and females, as well as developmental toxicity in the offspring'

Concentration limits

The WFD states that:

> 'When a waste contains a substance classified by one of the following hazard class and category codes and hazard statement codes and exceeds or equals one of the following concentration limits shown in Table 7 [see Table C10.1], the waste shall be classified hazardous according to HP 10. When more than one substance classified as toxic for reproduction is present in a waste, an individual substance has to be present at or above the concentration limit for the waste to be classified as hazardous by HP 10.'

Cut-off values

No cut-off values apply to this assessment.

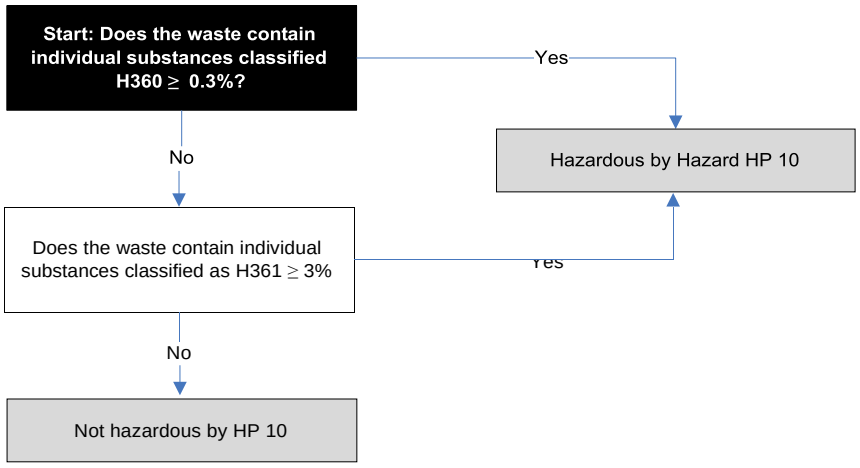
Table C10.1 Hazard class and category code(s) and Hazard statement code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 10 Toxic for Repr.

Hazard class and category code(s)	Hazard statement code(s)	Description	Concentration limit (Individual substance)
Repr. 1A	H360	May damage fertility or the unborn child	≥ 0.3%
Repr. 1B			
Repr. 2	H361	Suspected of damaging fertility or the unborn child	≥ 3.0%

Decision tree

Figure C10.1 sets out the assessment process for the Hazard HP 10.

Figure C10.1 | Decision tree for the assessment of Hazard HP 10 Toxic for Reproduction



Test methods

A HP 10 assessment of a waste will be based on the identification of the individual substances in the waste, their classification, and reference to concentration limits.

Where this is not possible, waste containing substances listed in Table C10.1 should be assessed for toxic for reproduction properties in accordance with the section 3.7 of the European Chemical Agency's guidance on the application of the CLP criteria.

Test methods should only be considered where indicated by that guidance.

The test methods that rely on animal testing, given in Council Regulation 440/2008, are not appropriate. Validated alternative tests are available from the European Union Reference Laboratory for alternatives to animal testing[11].

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Appendix C:

C11 Assessment of Hazard HP 11: Mutagenic

Definition

Annex III of the Waste Framework Directive defines HP 11 'Mutagenic' as:

'waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell'

Concentration limit

The WFD states that:

> 'When a waste contains a substance classified by one of the following hazard class and category codes and hazard statement codes and exceeds or equals one of the following concentration limits shown in Table 8 [See Table C11.1], the waste shall be classified hazardous according to HP 11. When more than one substance classified as toxic for reproduction is present in a waste, an individual substance has to be present at or above the concentration limit for the waste to be classified as hazardous by HP 11.'

Cut-off values

No cut-off values apply to this assessment.

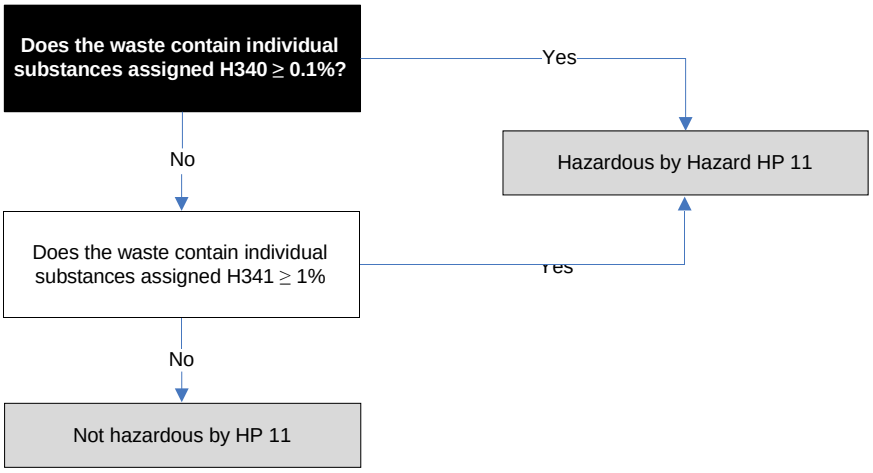
Table C1.11 Hazard class and category code(s) and Hazard statement code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 11 Mutagenic

Hazard class and category code(s)	Hazard statement code(s)	Description	Concentration limit (Individual substance)
Muta. 1A	H340	May cause genetic defects	≥ 0.1%
Muta. 1B			
Muta. 2	H341	Suspected of causing genetic defects	≥ 1.0%

Decision tree

Figure C11.1 sets out the assessment process for the Hazard HP 11.

Figure C11.1 | Decision tree for the assessment of Hazard HP 11 Mutagenic



Test methods

A HP 11 assessment of a waste will be based on the identification of the individual substances in the waste, their classification, and reference to concentration limits.

Where this is not possible, waste containing substances listed in Table C11.1 should be assessed for mutagenic properties in accordance with the section 3.5 of the European Chemical Agency's guidance on the application of the CLP criteria.

Test methods should only be considered where indicated by that guidance.

The test methods that rely on animal testing, given in Council Regulation 440/2008, are not appropriate. Validated alternative tests are available from the European Union Reference Laboratory for alternatives to animal testing[12].

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Appendix C:

C12 Assessment of Hazard HP 12: Release of an acute toxic gas

Definition

Annex III of the Waste Framework Directive defines HP 12 as:

'waste which releases acute toxic gases (Acute Tox. 1, 2 or 3) in contact with water or an acid'

Concentration limit

A waste isn't assessed for HP 12 with reference to limiting concentrations of substances. The WFD states that:

> 'When a waste contains a substance assigned to one of the following supplemental hazards EUH029, EUH031 and EUH032, it shall be classified as hazardous by HP 12 according to test methods or guidelines.'

A waste containing substances that are assigned EUH029, EUH031 and EUH032 can be tested to show whether it displays that hazardous property or not.

Alternatively where a waste contains substances assigned H260 or H261 it is possible to calculate the minimum amount of that substance that will give rise to HP 12 – see Section 12.5 below.

Otherwise a waste containing those substances can simply be assumed to be hazardous by HP 12.

Table C12.1 Hazard statements and supplemental hazards for waste constituents for the classification of wastes as hazardous by HP 12 Produces Toxic Gases in Contact with Water, Air or Acid

Hazard statement(s) / supplemental hazard(s)	
Contact with water liberates toxic gas	EUH029
Contact with acids liberates toxic gas	EUH031
Contact with acids liberates very toxic gas	EUH032

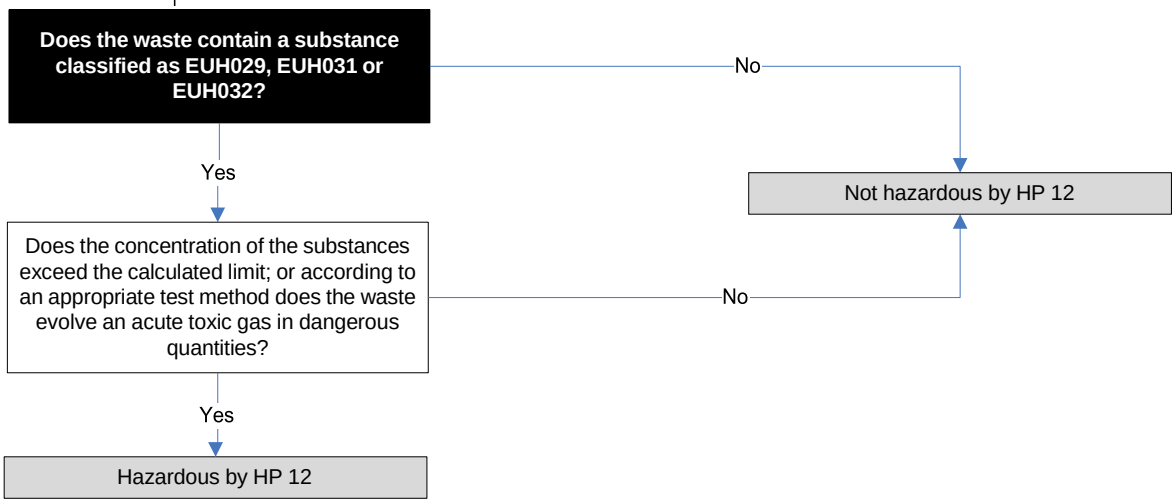
Cut-off values

No cut-off values apply to this assessment.

Decision tree

Figure C12.1 sets out the assessment process for the Hazard HP 12.

Figure C12.1 Decision tree for the assessment of Hazard HP 12 Produces Toxic Gases in Contact with Water,Air or Acid



Calculation method

A substance is assigned EUH029, EUH031 or EUH032 if it is capable of releasing an acute toxic gas[13] when water or acid is added.

If a waste contains a substance assigned EUH029, EUH031 or EUH032, it is possible to calculate the limiting concentration of the substance in the waste that would make it hazardous by HP 12. An example of how to do the calculation is given below in Box C12.1.

Box C12.1 Calculation method for Hazard HP 12

1. Write a balanced equation for the reaction that produces the gas. The general form of the equation is:

$$rR + wW = pP + gG$$

where R is the EUH029, EUH031 or EUH032 substance, W is water or an acid, P is a product of the reaction, and G is the gas released; r, w, p and g are the stoichiometric ratios that balance the equation.

2. Attribute molecular weights and stoichiometric ratios to the substances in the equation.

3. Divide (r x molar weight of R) by (g x 22.4). This gives the mass of R that will evolve 1 litre of gas. 1 mol of gas occupies 22.4 litres at standard temperature and pressure.

4. Divide this amount (in grams) by 1,000 (to convert to kilograms) and multiply it by 100 to give a percentage by weight, and thus the limiting concentration for HP 12 of substance R.

Example calculation: A waste contains aluminium nitride (AlN). Aluminium nitride is an EUH029 substance which reacts with water to give ammonia gas.

$$AlN + 3H_2O = Al(OH)_3 + NH_3$$

aluminium nitride — water — aluminium hydroxide — ammonia

r = 1 mol of AlN, R = 41 g; g = 1 mol NH_3.

Limiting concentration of aluminium nitride in waste is ((1 x 41) / (1 x 22.4) / 1000) x 100, which is 0.18% (approximately 0.2%).

[13] The gases that are likely to be released include hydrogen sulphide, hydrogen fluoride, carbon disulphide, sulphur dioxide, .

Threshold limits derived from the calculation for some EUH029, EUH031 or EUH032 substances are given below in Table C12.2.

Table C12.2 Examples of substances which may cause a waste to exhibit HP 12 and their threshold concentrations (note: this is not a complete list of substances with these properties)

Substance name	Hazard statement codes	Equation	Concentration limits for waste to be HP 12 (%)[1]
Phosphorous pentasulphide	EUH029	$P_2S_5 + 8H_2O \rightarrow 5H_2S + 2H_3PO_4$	0.1
3,5-dichloro-2,4-difluoro-benzoyl fluoride (DCDFBF)	EUH029	DCDFBF + $H_2O \rightarrow$ HF + Prod.	1.0
Metam-sodium	EUH031	$CH_3NHCS_2Na + H^+ \rightarrow CH_3NH_2 + CS_2 + Na^+$	0.5
Barium sulphide	EUH031	$BaS + 2H^+ \rightarrow H_2S + Ba^{2+}$	0.8
Barium polysulphides	EUH031	$BaS_n + 2H^+ \rightarrow H_2S + Ba^{2+} + S_{n-1}$	0.8
Calcium sulphide	EUH031	$CaS + 2H^+ \rightarrow H_2S + Ca^{2+}$	0.3
Calcium polysulphides	EUH031	$CaS_n + 2H^+ \rightarrow H_2S + Ca^{2+} + S_{n-1}$	0.3
Potassium sulphide	EUH031	$K_2S + 2H^+ \rightarrow H_2S + 2K^+$	0.5
Ammonium polysulphides	EUH031	$(NH_4)_2S_n + 2H^+ \rightarrow H_2S + 2NH_4^+ + S_{n-1}$	0.3
Sodium sulphide	EUH031	$Na_2S + 2H^+ \rightarrow H_2S + 2Na^+$	0.4
Sodium polysulphides	EUH031	$Na_2S_n + 2H^+ \rightarrow H_2S + 2Na^+ + S_{n-1}$	0.4
Sodium dithionite	EUH031	$Na_2O_6S_2 + 2H^+ \rightarrow 2Na^+ + SO_2 + H_2SO_4$	0.9
Sodium hypochlorite, solution Cl active[2]	EUH031	$2NaOCl + 2H^+ \rightarrow Cl_2 + 2Na^+ + H_2O$	2.9
Calcium hypochlorite, solution Cl active[2]	EUH031	$Ca(OCl)_2 + 2H^+ \rightarrow Cl_2 + Ca^{2+} + H_2O$	0.6
Dichloroisocyanuric acid	EUH031	$C_3HCl_2N_3O_3 + 2H^+ \rightarrow C_3H_3N_3O_3 + Cl_2$	0.9
Dichloroisocyanuric acid, sodium salt of	EUH031	$C_3Cl_2N_3O_3Na + 3H^+ \rightarrow C_3H_3N_3O_3 + Cl_2 + Na^+$	1.0
Sodium dichloroisocyanruate, dihydrate	EUH031	$C_3Cl_2N_3O_3Na.2H_2O + 3H^+ \rightarrow C_3H_3N_3O_3 + Cl_2 + Na^+ + 2H_2O$	1.1
Trichloroisocyanuric acid	EUH031	$2C_3Cl_3N_3O_3 + 6H^+ \rightarrow 2C_3H_3N_3O_3 + 3Cl_2$	0.7

Substance name	Hazard statement codes phrases	Equation	Threshold concentration for waste to be HP 12 (%)[1]
Hydrogen cyanide, salts of (with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide)	EUH032	$NaCN + H^+ \rightarrow HCN + Na^+$	0.2
Sodium fluoride	EUH032	$NaF + H^+ \rightarrow HF + Na^+$	0.2
Sodium azide	EUH032	$NaN_3 + H^+ + H_2O \rightarrow NO_2 + NH_3 + Na^+$	0.3
Trizinc disphosphide	EUH032	$Zn_3P_2 + 6H^+ \rightarrow 2PH_3 + 3Zn^{2+}$	0.6
Calcium cyanide	EUH032	$Ca(CN)_2 + 2H^+ \rightarrow 2HCN + Ca^{2+}$	0.2
Cadmium cyanide	EUH032	$Cd(CN)_2 + 2H^+ \rightarrow 2HCN + Cd^{2+}$	0.4
Aluminium phosphide	EUH029 EUH032	$AlP + 3H^+ \rightarrow PH_3 + Al^{3+}$ $AlP + 3H_2O \rightarrow PH_3 + Al(OH)_3$	0.3 0.3
Calcium phosphide	EUH029	$Ca_3P_2 + 6H_2O \rightarrow 2PH_3 + 3Ca(OH)_2$	0.4
Magnesium phosphide	EUH029 EUH032	$Mg_3P_2 + 6H_2O \rightarrow 2PH_3 + 3Mg(OH)_2$	0.3
Trizinc diphosphide	EUH029 EUH032	$Zn_3P_2 + 6H_2O \rightarrow 2PH_3 + 3Zn(OH)_2$	0.6

Notes:

[1] Rounded to one decimal place

[2] Based on 29.3 g sodium hypochlorite per 100 ml (max solubility)

Test methods

There are no direct test methods for HP 12.

Where a test is necessary the test method for emission of flammable gas provided in section 2.12 of the European Chemical Agency's Guidance on the Application of the CLP should be used. Where the waste contains EUH031 or EUH032 substances a 1 M hydrochloric acid solution can be used to replace the water in the test.

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Appendix C:

C13 Assessment of Hazard HP 13: Sensitising

Definition

Annex III of the Waste Framework Directive defines HP 13 'Sensitising' as:

'waste which contains one or more substances known to cause sensitising effects to the skin or the respiratory organs'

Concentration limits

The WFD states that:

> 'When a waste contains a substance classified as sensitising and is assigned to one of the hazard statement codes H317 or H334 and one individual substance equals or exceeds the concentration limit of 10%, the waste shall be classified as hazardous by HP 13.'

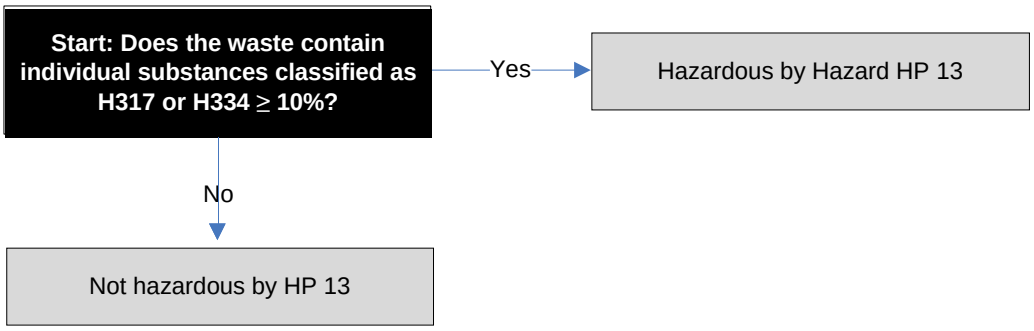
Table C13.1 Hazard class and category code(s) and Hazard statement code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 13 Sensitising

Hazard class and category code(s)	Hazard statement code(s)	Description	Concentration limit (Individual substance)
Skin Sens. 1, 1A,and 1B	H317	May cause an allergic skin reaction	≥ 10%
Resp. Sens. 1, 1A and 1B	H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled	≥ 10%

Decision tree

Figure C13.1 sets out the assessment process for the Hazard HP 13.

Figure C13.1 Decision tree for the assessment of Hazard HP 13 Sensitising



Test methods

A HP 13 assessment of a waste will be based on the identification of the individual substances in the waste, their classification, and reference to concentration limits.

Where this is not possible, waste containing substances listed in Table C13.1 should be assessed for sensitising properties in accordance with the section 3.4 of the European Chemical Agency's guidance on the application of the CLP criteria.

Test methods should only be considered where indicated by that guidance.

The test methods that rely on animal testing, given in Council Regulation 440/2008, are not appropriate. Validated alternative tests are available from the European Union Reference Laboratory for alternatives to animal testing[14].

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Appendix C:

C14 Assessment of Hazard HP 14: Ecotoxic

Definition

Annex III of the Waste Directive defines HP 14 as:

'waste which presents or may present immediate or delayed risks for one or more sectors of the environment'

Concentration limit

The WFD states that:

When waste fulfils the conditions set out in any of the following points, it shall be classified as hazardous by HP 14:

- Waste which contains a substance classified as ozone depleting assigned the hazard statement code H420 in accordance with Regulation (EC) No 1272/2008 of the European Parliament and of the Council* and the concentration of such a substance equals or exceeds the concentration limit of 0.1%.

  [c(H420) ≥ 0.1%] (equation 1)

- Waste which contains one or more substances classified as aquatic acute assigned the hazard statement code H400 in accordance with Regulation (EC) No 1272/2008 and the sum of the concentrations of those substances equals or exceeds the concentration limit of 25%. A cut-off value of 0.1% shall apply to such substances.

  [Σ c (H400) ≥ 25 %] (equation 2)

- Waste which contains one or more substances classified as aquatic chronic 1, 2 or 3 assigned to the hazard statement code(s) H410, H411 or H412 in accordance with Regulation (EC) No 1272/2008, and the sum of the concentrations of all substances classified as aquatic chronic 1 (H410) multiplied by 100 added to the sum of the concentrations of all substances classified as aquatic chronic 2 (H411) multiplied by 10 added to the sum of the concentrations of all substances classified as aquatic chronic 3 (H412) equals or exceeds the concentration limit of 25%. A cut-off value of 0.1% applies to substances classified as H410 and a cut-off value of 1% applies to substances classified as H411 or H412.

  [100 x Σc (H410)) + 10 x Σc (H411) + Σc (H412) ≥ 25%] (equation 3)

- Waste which contains one or more substances classified as aquatic chronic 1, 2, 3 or 4 assigned the hazard statement code(s) H410, H411, H412 or 413 in accordance with Regulation (EC) No 1272/2008, and the sum of the concentrations of all substances classified as aquatic chronic equals or exceeds the concentration limit of 25%. A cut-off value of 0.1% applies to substances classified as H410 and a cut-off value of 1% applies to substances classified as H411, H412 or H413.

  [Σ c H410 + Σ c H411 + Σ c H412 + Σ c H413 ≥ 25 %], (equation 4)

where: Σ = sum and c = concentrations of the substances.

Cut-off values

The following cut-off values apply to the assessment:

- For H400, H410 : 0.1%
- For H411, H412 or H413: 1%

No cut-off value applies to H420.

An individual substance present at a concentration below this cut off value is not included in the sum of the concentrations for the hazard statement code that the cut-off applies too. A substance with two hazard statement codes with different cut-offs may be included in one equation and excluded from another.

Table C14.1 Hazard class and category code(s) and Hazard statement code(s) for waste constituents for the classification of wastes as hazardous by HP 14 Ecotoxic

Hazard class and category code(s)	Hazard statement code(s)	Description	Concentration limit
Aquatic Acute 1	H400	Very toxic to aquatic life	Equation 2
Aquatic Chronic 1	H410	Very toxic to aquatic life with long lasting effects	Equations 3 and 4
Aquatic Chronic 2	H411	Toxic to aquatic life with long lasting effects	Equations 3 and 4
Aquatic Chronic 3	H412	Harmful to aquatic life with long lasting effects	Equations 3 and 4
Aquatic Chronic 4	H413	May cause long lasting effects to aquatic life	Equation 3
Ozone	H420	Harms public health and the environment by destroying ozone in upper atmosphere	0.1%

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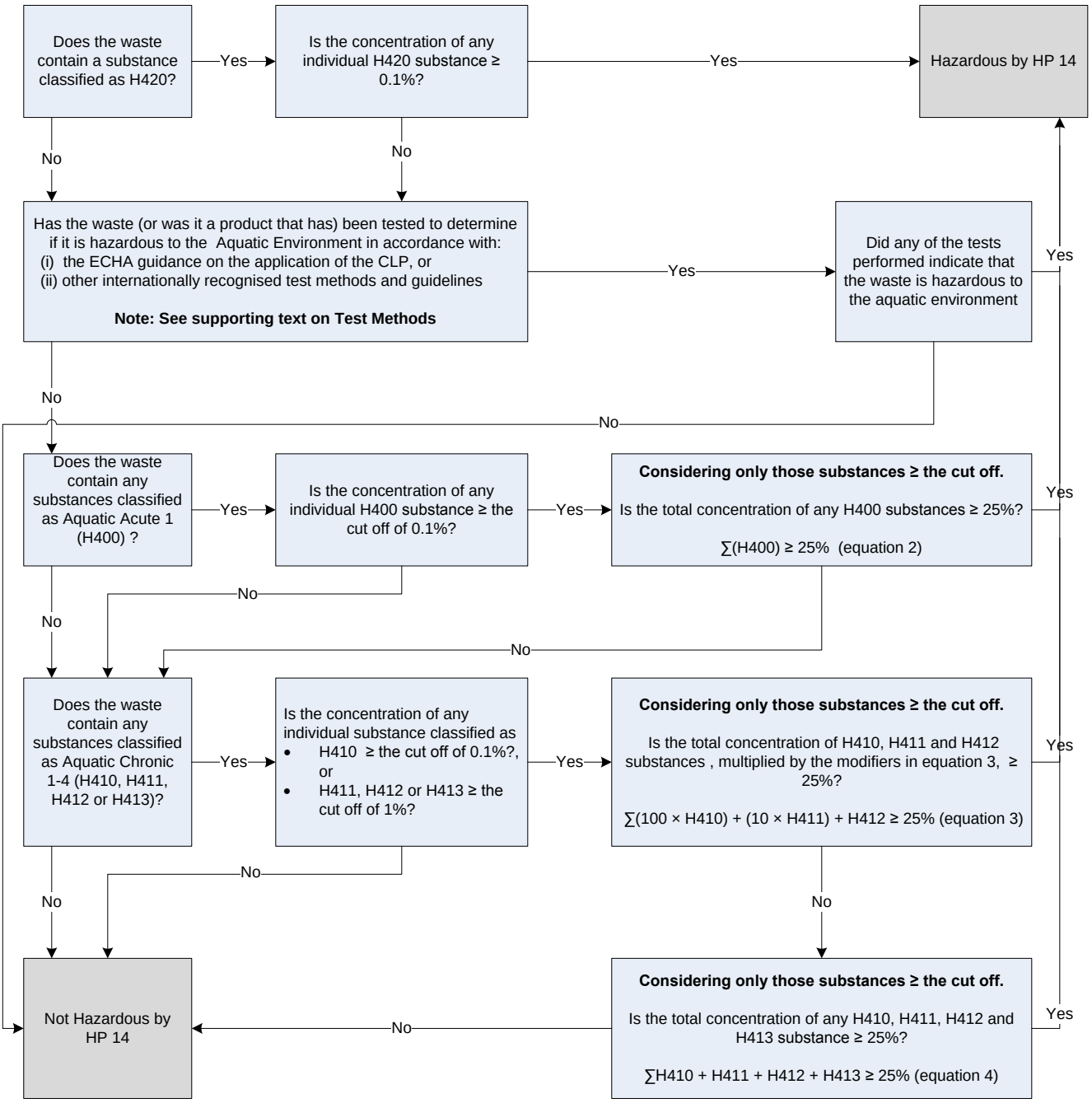
Decision tree

Figure C14.1 sets out the assessment process for the Hazard HP 14.



Test methods

The List of Waste Decision states

> Where a hazardous property of a waste has been assessed by a test and by using the concentrations of hazardous substances as indicated in Annex III to Directive 2008/98/EC, the results of the test shall prevail.
>
> A hazardous property can be assessed by using the concentration of substances in the waste as specified in Annex III to Directive 2008/98/EC or, unless otherwise specified in Regulation (EC) No 1272/2008, by performing a test in accordance with Regulation (EC) No 440/2008 or other internationally recognised test methods and guidelines, taking into account Article 7 of Regulation (EC) No 1272/2008 as regards animal and human testing.

You should not generally undertake further testing to assess waste for HP14 because :

- Testing may require a fish (vertebrate) test, which is subject to legal restrictions on animal testing
- Chemical legislation and guidance is now designed to avoid testing mixtures for aquatic environmental hazards and use calculations instead.
- Many wastes are mixtures (i.e. they contain more than one chemical substance). Mixtures can be exceptionally difficult to test.

The summation approach, using equations 1 to 4, should be used where possible. In nearly all cases the chemicals present in a waste are known, can be identified analytically, and the 'worst case' approach can be used to support this.

If you are considering testing, you should follow the current ECHA guidance on application of the CLP criteria. You should test in accordance with that guidance, using only methods accepted for CLP use, and only where it is indicated as appropriate.

If you have existing test data you should interpret it in accordance with ECHA guidance, with particular noting the following:

- Data from appropriate test methods for each of fish, invertebrates and algae are normally required (this may include chronic as well as acute data).
- Data from testing of Water Accommodation Fractions is normally not sufficient to assess a waste that is a mixture.
- Information on the 'rapid degradability' and bioaccumulation potential of each relevant substance in the mixture may also be needed
- Testing of a mixture can be exceptionally difficult and expensive to perform ECHA indicate that *'The testing of a mixture for aquatic toxicity is highly complex, both in terms of the conduct of the test, and in the interpretation of data from such testing. The different physico-chemical properties, such as water solubility, vapour pressure, and adsorption, make it almost impossible to prepare an exposure concentration that is characteristic of the mixture, while the multi-component analysis needed to verify such an exposure concentration is both complex and expensive.'*

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Appendix C:

C15 Assessment of Hazard HP 15: Waste capable of exhibiting a hazardous property listed above not directly displayed by the original waste

Definition

Annex III of the Waste Framework Directive defines HP 15 as:

'waste capable of exhibiting a hazardous property listed above not directly displayed by the original waste'

Concentration limit

A waste isn't assessed for HP 15 with reference to limiting concentrations of substances. The WFD states that:

> 'When a waste contains one or more substances assigned to one of the hazard statements or supplemental hazards shown in Table 9 [see table C15.1], the waste shall be classified as hazardous by HP 15, unless the waste is in such a form that it will not under any circumstance exhibit explosive or potentially explosive properties.
>
> In addition, Member States may characterise a waste as hazardous by HP 15 based on other applicable criteria, such as an assessment of the leachate.'

A waste containing substances that are assigned hazard statement or supplemental hazard codes in Table C15.1 can be tested to show whether it exhibits that hazardous property or not. Alternatively a waste containing those substances can simply be assumed to be hazardous by HP 15.

No cut-off values apply to this assessment.

Table C15.1 Hazard statements and supplemental hazards for waste constituents for the classification of wastes as hazardous by HP 15

Hazard statement(s) / supplemental hazard(s)	
May mass explode in fire	H205
Explosive when dry	EUH001
May form explosive peroxides	EUH019
Risk of explosion if heated under confinement	EUH044

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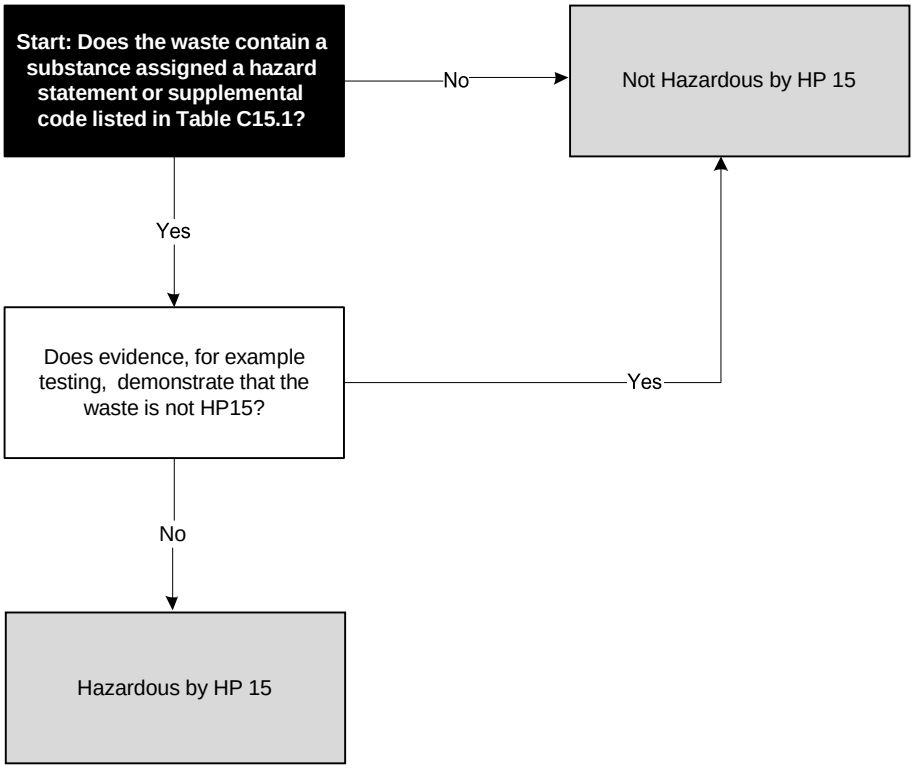
Decision tree

Figure C15.1 sets out the assessment process for the Hazard HP 15.

Figure C15.1 | Decision tree for the assessment of Hazard HP 15



Test methods

Wastes containing substances listed in Table C15.1 should be assessed or tested for in accordance with the European Chemical Agency's guidance on the application of the CLP criteria. Section 2.1 provides guidance on the classification of mixtures for EUH001, EUH044 and H205.

A waste that would be labelled with a hazard statement or supplementary hazard code as a result assessment for EUH001, EUH019, EUH044 or H205 possesses the hazardous property HP 15.

Appendix C:

C16 Assessment of Persistent Organic Pollutants:

Definition

Annex III of the Waste Framework Directive does not assign a hazardous property to persistent organic pollutants (POPs):

Concentration limit

The List of Waste states that:

> 'Wastes containing polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF), DDT (1,1,1-trichloro-2,2-bis (4-chlorophenyl)ethane), chlordane, hexachlorocyclohexanes (including lindane), dieldrin, endrin, heptachlor, hexaclorobenzene, chlordecone, aldrine, pentachlorobenzene, mirex, toxaphene hexabromobiphenyl and/or PCB exceeding the concentration limits indicated in Annex IV to Regulation (EC) No 850/2004 [see Table 16.1] shall be classified as hazardous.'

Note Regulation EC No 850/2004 was repealed and replaced by Regulation (EU) 2019/1021.

A waste containing persistent organic pollutants listed in Table C16.1 is hazardous if the concentration of the POP is above the concentration limit assigned to it in Annex IV of Regulation (EU) 2019/1021

These thresholds are reproduced in Table C16.1. Users should note that any amendments to the thresholds listed in annex IV of (EU) 2019/1021 take precedence over threshold values listed here.

Cut-off values

No cut-off values apply to this assessment.

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Table C16.1 Concentration limits for the classification of wastes as hazardous due to the presence of persistant organic pollutants

Substance	CAS No.	EU No.	Concentration limit
Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF)			15 µg/kg(1)
DDT (1,1,1-trichloro-2,2-bis (4-chlorophenyl)ethane)	50-29-3	200-024-3	50 mg/kg
Chlordane	57-74-9	200-349-0	50 mg/kg
Hexachlorocyclohexanes, including lindane	58-89-9 319-84-6 319-85-7 608-73-1	210-168-9 200-401-2 206-270-8 206-271-3	50 mg/kg
Dieldrin	60-57-1	200-484-5	50 mg/kg
Endrin	72-20-8	200-775-7	50 mg/kg
Heptachlor	76-44-8	200-962-3	50 mg/kg
Hexachlorobenzene	118-74-1	200-273-9	50 mg/kg
Chlordecone	143-50-0	205-601-3	50 mg/kg
Aldrin	309-00-2	206-215-8	50 mg/kg
Pentachlorobenzene	608-93-5	210-172-5	50 mg/kg
Polychlorinated Biphenyls (PCB)	1336-36-3 and others	215-648-1	50 mg/kg(2)
Mirex	2385-85-5	219-196-6	50 mg/kg
Toxaphene	8001-35-2	232-283-3	50 mg/kg
Hexabromobiphenyl	36355-01-8	252-994-2	50 mg/kg

(1) The limit is calculated as PCDD and PCDF according to toxic equivalency factors (TEFs) in Table C16.2.

(2) Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.

Table C16.2 Toxic equivalency factors (TEFs) for polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF)

PCDD	**TEF**	**PCDF**	**TEF**	**PCDF**	**TEF**
2,3,7,8-TeCDD	1	1,2,3,6,7,8-HxCDF	0.1	2,3,7,8-TeCDF	0.1
1,2,3,7,8-PeCDD	1	1,2,3,7,8,9-HxCDF	0.1	1,2,3,7,8-PeCDF	0.03
1,2,3,4,7,8-HxCDD	0.1	2,3,4,6,7,8-HxCDF	0.1	2,3,4,7,8-PeCDF	0.3
1,2,3,6,7,8-HxCDD	0.1	1,2,3,4,6,7,8-HpCDF	0.01	1,2,3,4,7,8-HxCDF	0.1
1,2,3,7,8,9-HxCDD	0.1	1,2,3,4,7,8,9-HpCDF	0.01		
1,2,3,4,6,7,8-HpCDD	0.01	OCDF	0.0003		
OCDD	0.0003				

The waste is hazardous if:

$$\Sigma[C_i \times TEF_i] > 15\ \mu g/kg$$

Where

- C_i is the concentration of an individual PCDD or PCDF, and
- TEF_i is the toxic equivalency factor for an individual PCDD or PCDF
- Σ adds the values for each individual PCDD and PCDF present together.

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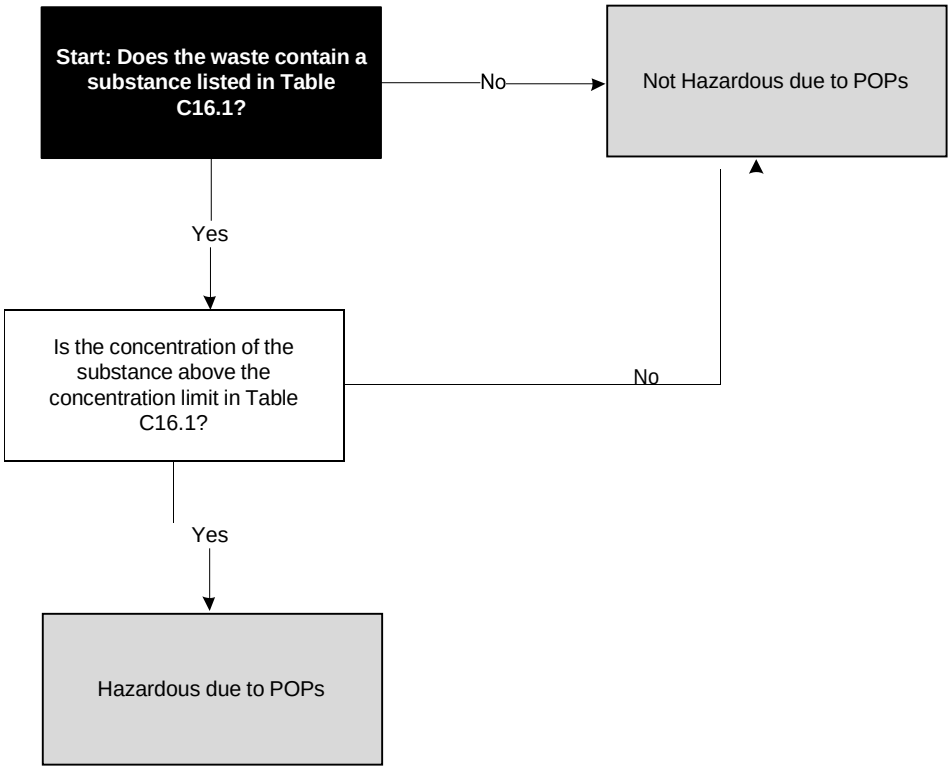
Decision tree

Figure C16.1 sets out the assessment process for persistent organic pollutants.

Figure C16.1 | Decision tree for the assessment of Persistent Organic Pollutants



Test methods

There are no test methods for persistent organic pollutants. Assessment is based on knowledge of the chemical composition of the waste determined by sampling and analysis.

Appendix D:

Waste sampling

Background

Introduction

You must properly plan and conduct the sampling programme to ensure you obtain accurate and representative results, so a reliable assessment. You need to prepare a sampling plan before you take the first sample. This will help you ensure you've considered relevant factors and take sufficient representative samples. Then all parties will have confidence in the reliability of the results and their interpretation.

You should be prepared to provide a copy of your sampling plan to support any waste classifications and hazardous waste assessments you have made.

Legal background

It's a legal requirement to correctly assess and classify your waste. For many wastes there may be sufficient information to do this without the need to sample. Where sampling is needed this appendix is guidance to help you do so properly.

This is based on the current European and British Standard, and supporting Technical Reports, on the Characterisation of waste – Sampling of waste materials, these are:

- Framework for the preparation and application of a sampling plan (BS EN 14899:2005)
- Part 1: Guidance on selection and application of criteria for sampling under various conditions (PD CEN/TR 15310-1:2006)
- Part 2:Guidance on sampling techniques (PD CEN/TR 15310-2:2006)
- Part 3: Guidance on procedures for sub-sampling in the field (PD CEN/TR 15310-3:2006)
- Part 4: Guidance on procedures for sample packaging, storage, preservation, transport and delivery (CEN/TR 15310-4:2006)
- Part 5: Guidance on the process of defining the sampling plan (PD CEN/TR 15310-5:2006)

The environmental regulators will use these documents as the basis for assessing sampling procedures during our regulatory activities.

Alternative sampling procedures are acceptable if they've considered the relevant factors identified here and produce an equally reliable result.

Results should only be used, for waste classification or hazardous waste assessment purposes, if the sampling has considered all the relevant factors.

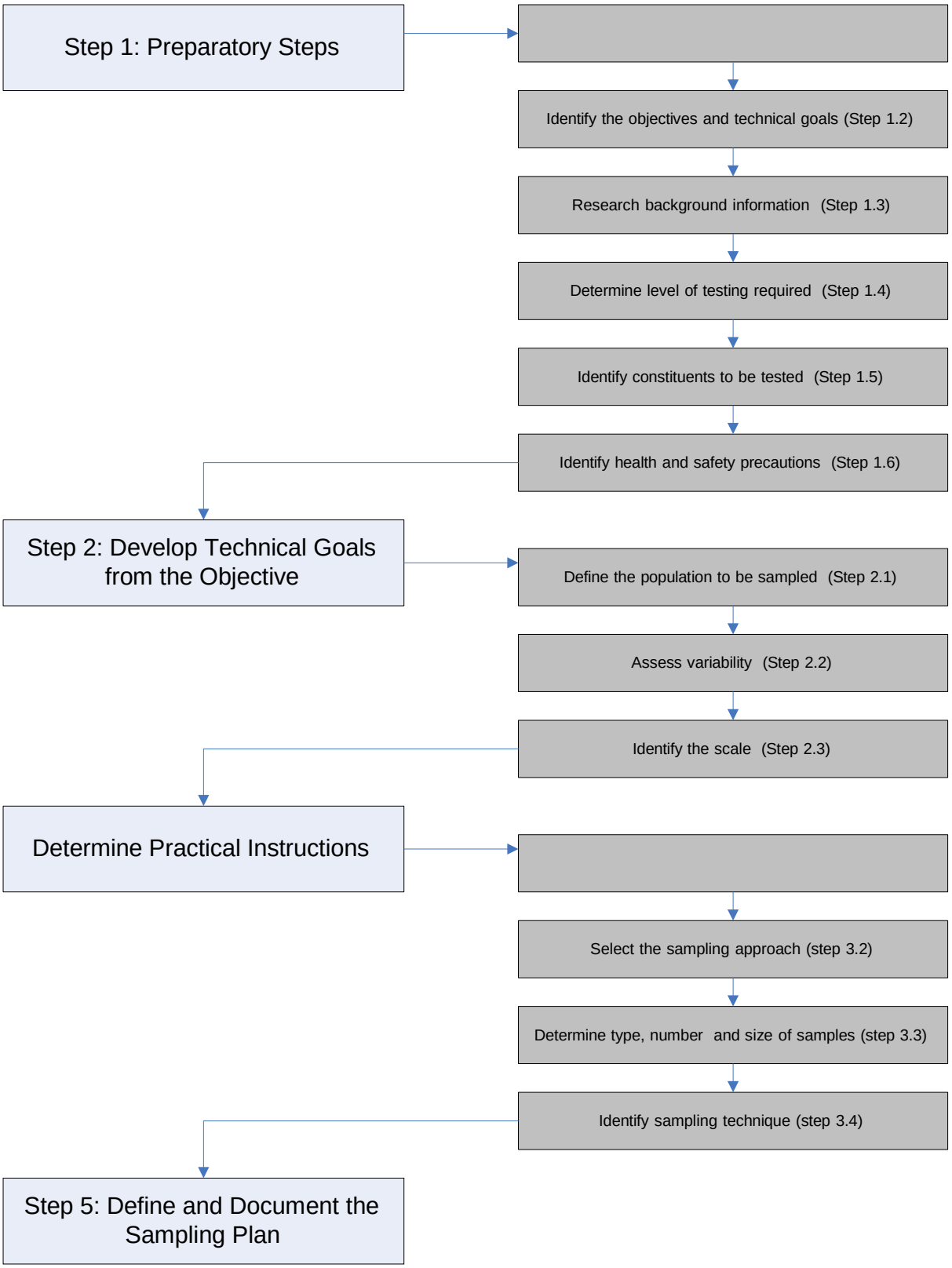
The testing programme

The testing programme can be broken down into key steps including:

- transporting and storing the sample
- preparing and analysing the sample
- reporting and interpreting the results

Figure D1 sets out the key steps involved in defining the sampling plan.

Figure D1 | Defining the sampling plan



Application of this chapter

This chapter provides guidance on how to assess a single waste using the results obtained by taking a number of samples of that waste.

Any waste (or individual batch/container thereof), or any waste in a mixed waste, that if sampled and assessed in isolation, would produce a classification or hazardous property different from others in that population, should be regarded as a discrete sub-population and assessed separately. This would include waste soil from 'hotspots' identified during site investigations. The sampling plan should be designed to enable reliable identification of such sub-populations.

Step 1: Preparatory steps

Step 1.1: Identify the involved parties

The sampling plan should be prepared under the direction of a nominated person, familiar with the requirements, in consultation with the appropriate involved parties.

The need to involve other parties will vary in each case, depending on the complexity, scale and purpose of the sampling. These parties may have additional or conflicting interests that should not undermine the objective.

Example of involved parties	Typical role
Producer / Holder	Directly involved as responsible for the waste classification and assessment (and completion of waste documentation)
Laboratory / Sampler / Consultants engaged in sampling and analysis	Directly involved as responsible for conducting parts of the testing programme.
Carrier and Consignee	Directly involved, as the information is pertinent to carriage, subsequent management and completion of waste paperwork.
Regulator	Indirectly involved via provision of advice and guidance. May become directly involved through compliance checks.

Step 1.2: Identify the objectives and technical goals

A testing programme for hazardous waste assessment should normally have only one objective; to obtain sufficient information on the nature, composition and properties of the waste to determine if it is a hazardous waste, to assign hazardous properties, and to inform allocation the appropriate List of Waste (LoW) code.

If there is more than one objective, each should have a separate testing programme designed to deliver that objective.

The testing programme for hazardous waste assessment should be broken down into specific technical goals which may include, for example:

- identifying if the waste is mixture of two or more wastes or subpopulations
- identifying which hazardous substances are present
- determining the concentration of hazardous substance present
- testing directly for certain hazardous properties for which that is appropriate, for example HP 3 Flammable

In the sampling plan each of these technical goals should be further broken down into detailed instructions and technical specifications that should address, for example:

- define the population to be sampled
- assess variability

- select the sampling approach
- select constituents to be studied
- identify the scale
- choose the statistical approach

Step 1.3: Determine level of testing required

The testing level is the type(s) and frequency of investigation required to meet the technical goals and deliver the objective. This is largely determined by how much information you already have, and how much is unknown, and may for example encompass each of the following:

Basic (comprehensive) characterisation: a thorough initial investigation of a waste, considering the key aspects in this chapter, to support development of a compliance testing programme. These are normally required:

- initially, or periodically, where a process or activity regularly produces waste, (for example the outputs of a waste treatment process), and/or
- where many of the relevant factors (for example nature and causes of variability) are unknown

Compliance testing: the routine sampling and assessment of a waste or wastes, for example to compare the concentrations of hazardous substances to hazardous waste thresholds. This is likely to be appropriate:

- for processes or activities that regularly produce waste where basic characterisation has already provided sufficient information on the relevant factors (for example, to identify sub-populations), or
- for one-off wastes of a type that is well characterised

On-site verification: checks at any point in the waste chain, using 'quick check' methods to confirm specific information obtained from compliance testing or included on the waste paperwork. These are confirmatory checks only, not a stand alone hazardous waste assessment and might for example include:

- identification of visually non-conforming wastes in bulk containers
- a check of key relevant characteristic, eg pH or a metal concentration

Example: how levels of testing are applied

A waste treatment process receives and processes waste of variable quality after robust pre-acceptance and waste acceptance checks. The composition and potential contaminants, or non-conforming elements, of the input materials are known or reasonably predictable.

The waste is received from 10 different producers via a number of intermediary carriers and transfer stations.

A comprehensive basic characterisation study is undertaken to provide evidence of the impact of the various factors identified in this chapter (from differences in input materials from different producers, to heterogeneity of treated residues and identification of sub-populations)

From this a routine **compliance testing programme** is designed that involves identification and regular assessment of the output sub-populations from the treatment plant for a range of relevant parameters, excluding those proven unnecessary by the basic characterisation tests.

In addition each batch of treated residues is **verified on site** specifically for pH and nickel contamination, as basic characterisation identified the potential for individual batches to be hazardous as a result of these two criteria.

Step 1.4: Research background information

Site details

The sampling plan should identify the details of the sampling location and restrictions to access. Any additional access problems encountered during sampling must be recorded in the sampling record so any impacts on the quality of the collected samples can be considered.

Process or nature of arising

The sampling plan should include a general description of the circumstances that resulted in the waste being produced. This could be based on:

- direct knowledge of the primary process
- the nature of arising, or
- inspection of the process / nature of arising

Material type and dimensions

The sampling plan should identify the physical nature and dimensions of the sub-population to be sampled. For example, this might include:

- solids, liquid or gas
- moving stream (e.g. conveyor or pipeline) or static
- if static, is it contained or in heaps
- number of containers, and quantity, ie kilos, tonnes, etc
- physical and chemical characteristics

The sampling plan must list all known physical and chemical characteristics of the material including all known potential hazards, and any operational procedures that could affect the chemical, biological and physical properties.

Step 1.5: Identify constituents to be tested

For waste classification there are three key points to consider:

- the regulations require that the composition of the waste, concentration of the components, and hazardous properties are recorded on the consignment note - this is not restricted to hazardous substances
- many 'mirror' entries in the LoW consider all hazardous substances and persistent organic pollutants
- some LoW entries may identify the relevance of specific items, articles, components, properties or substances to determining the classification

In many instances it will be possible to reduce the number of constituents to be tested to a much smaller number of key constituents. For example, the possible constituents of waste from a manufacturing process may be extrapolated from the raw materials and process itself. Substances that are **known** not to be present, used, or produced by the process can often be excluded.

In other circumstance a basic (comprehensive) characterisation exercise might be undertaken, considering a wide range of hazardous substances, to identify those of potential relevance. Compliance testing can subsequently focus on those substances.

Note: if the inputs to a process are variable, poorly characterised, or subject to more limited checks, then the uncertainty over the constituents would require more expansive testing.

The constituents considered, and the basis for any potentially relevant exclusions, should be specified in the sampling plan.

Step 1.6: Identify health and safety precautions

A full exploration of this issue is beyond the scope of this document. You should always seek advice from a qualified health and safety professional.

The sampling plan should ensure that all relevant health and safety issues, and necessary precautions, are identified to those involved in the testing programmes. This might include, for example, risks arising from:

- the nature of the waste
- how it is contained or stored
- access
- site operations, plant or activities, or
- sampling equipment or tools

Step 2: Develop the technical goals from the objectives

Step 2.1 Define the population to be sampled

The sampling plan should contain a description of the population or subpopulations to be sampled to avoid ambiguity.

Population

The 'population' is the total amount of waste that you want to obtain information on by sampling. Examples might include:

- a single container of waste
- a batch of waste from a process, or
- a continuous stream of waste produced by a production process in a specific period of time (eg a day, a week, a month)

It is important to note that the population must always be defined explicitly with reference to spatial or temporal factors, otherwise it is impossible to determine if sampling of that population is representative or not. The choice of population relies on experience and judgement, rather than statistics.

Key point: If the population is defined as the waste from a process produced over a period of one month, then the testing programme will not be completed until that one month of production has been sampled. None of the waste produced can be assessed, classified and disposed of before then.

Overall population

The term overall population is sometimes used to indicate a wider population, of which the sampled population(s) is itself a subset. For example the entire lifetimes operational output of a process would be an 'overall population'. From within this overall population one or more populations might be defined for sampling and assessment purposes.

In some instances it may be possible to apply the results of sampling a population to an overall population, however to do so the onus in on the producer to demonstrate during the testing programme that the overall population does not differ from the population. This is most likely to be applicable where a manufacturing process generates a continuous stream of homogenous waste from raw materials of a defined composition.

Sub-populations

Depending on the circumstances it is sometimes necessary to divide a population into sub-populations, a portion of the material that needs to be sampled and the results considered separately. For example a process might generate 24 batches of waste (the population), however each batch is a sub-population that is sampled and assessed separately.

The division into subpopulations is normally required where the samples from one portion of the population may generate a different classification when considered separately from another portion. Conversely, if the producer wishes to consider all the wastes to be part of a single population, with no

sub-populations, the testing programme would need to demonstrate that this is a reasonable assumption and that no sub-populations exist.

The nature of the waste production process is the principal factor that determines the need for subpopulations. The more consistent, controlled and characterised the process, its outputs, and its raw materials/feedstock, the fewer sub-populations are likely to be generated.

Sub-populations may also be generated:

- where access restrictions inhibit or prevent access to the population as a whole, or
- by characteristics such as non-conforming or deviating parts in the waste

Due consideration needs to be given to 'scale' when defining the subpopulation.

The samples taken from a sub-population can only be considered representative of that sub-population. The relevance of these results to the population is entirely dependent on the validity of the assumptions made in generating the sampling plan.

One-off production waste

The simplest form of waste production is a one-off production of a single waste stored in a single container, stockpile, lorry or other container. The 'population' can easily be defined as the material in the specific container or location. There is no need to divide this into subpopulations.

The next level of complexity is where a one-off production of a waste is stored in more than one container. Although sampling would normally include multiple containers, the need to divide this into subpopulations would be dependent on whether other factors differentiate the containers (for example different storage conditions or methods).

Continuous production of a homogenous stream of waste

Where a continuous process produces a stream of waste that is homogenous the population can be defined in time. For example, all the waste produced in one month or one year.

The waste classification and assessment delivered by the sampling plan can be applied to that entire time period. However the sampling plan would have to demonstrate that the material is homogenous. The two key factors to underpin this are:

- a process with demonstrably consistent, well characterised, and controlled inputs/raw materials that do not vary in composition or quantity, and
- the results from the sampling demonstrate that no statistical difference exists between samples taken over the time period (i.e. one batch is the same as any other)

This is more likely to be applicable to manufacturing processes using quality raw materials, than waste disposal or recovery processes where that level of input control is not achievable.

Continuous production of a heterogeneous stream of waste

Continuous production processes can often result in a stream of heterogeneous (variable quality) waste. This is particularly true of waste disposal or recovery processes where the nature, composition, consistency of quantity of input materials is potentially more variable than the higher quality raw materials used in production processes.

The consequence is that one portion of the waste stream may differ from another. Specifically, they may have different compositions, properties and/or classifications.

For the purposes of hazardous waste assessment and waste classification the sampling plan should be organised specifically to identify the proportion of the waste stream that:

- is hazardous, and/or
- is classified under a different LoW code

To sample a waste of this nature, and gain and insight into the heterogeneity of the population, the waste will need to be divided into sub-populations. These sub-populations should be physically separated until the results of the testing programme are obtained to allow separate actions to be taken as a consequence of different classifications etc.

The standard and technical reports identify three different perspectives generally applicable to waste characterisation:

Perspective	Advantage	Disadvantage
Production	Potentially a clear relation between the sub-population and the production process results in relatively lower costs for the testing programme	Production process must be known and samples must be taken during or directly after production
Transport	Practical from the perspective of sampling	Might result in high costs when there are lots of sub-populations
Destination	Potentially a direct link can be defined between the quantities of material that are considered relevant, for example from a toxicological perspective	Variations caused by production, transport and/or mixing of quantities can no longer be identified

The legal requirements for waste classification and assessment relate principally to the production of hazardous waste and prevention of its subsequent mixing. This is entirely independent of subsequent transport to a destination. Production therefore becomes the primary mechanism for defining sub-populations for hazardous waste assessment. Any differences in the production process that might cause variation in the waste produced should be considered, for example:

- different producer, department or activity
- variations in the quality of raw materials or feedstock
- waste produced by more than one device, unit or plant
- where the production process is not uniform (for example production of one batch differs from the next)

Once production subpopulations have been determined further subdivisions relating to transport and destination can also be considered if necessary.

As each load of hazardous waste, when transported, is accompanied by a consignment note, variations between loads also have the potential to generate subpopulations. There are several options, depending on the circumstances, including regarding each load as:

- an entirely separate population
- a separate sub-population

Where several loads are transported to the same destination, it may also be appropriate to define the sub-population by destination, grouping those loads together.

Mixed waste

Where the waste is a mixture of two or more wastes then the testing programme would normally need to classify and assess each waste separately.

The sole exception would be where the LoW specifically provides a code for mixed waste of that nature. In this instance the testing programme would normally need to determine the relative proportions and composition of each waste in the mix.

Where the list of wastes provides a single code for a mixed waste, it should be noted that the scope of the single code would not include a waste(s) that the law would prohibit from being combined with the other waste(s). Such a waste would need to be coded and assessed separately.

Typical examples of mixed waste that has to be assessed as separate wastes include:

- **waste disposal / recovery process residues -** A waste treatment process generates five batches of filtercake. Due to the variation and nature of the waste inputs processed the last batch is actually hazardous. The hazardous batch would need to be identified, assessed and coded separately (as a sub-population) from the non-hazardous batches. The five batches should not be assessed as a single waste.

- **asbestos materials in construction and demolition waste -** The LoW contains specific codes for construction or insulation materials containing asbestos. This asbestos should normally be assessed and classified separately from other wastes. Therefore a skip containing a mixture of construction and demolition waste and asbestos containing insulation board, tiles, coatings, etc (or fragments thereof) should be classified as mixed, and the asbestos materials classified and assessed separately.
- **laboratory chemicals,** consisting of or containing hazardous substances, including mixtures of laboratory chemicals **-** A crate containing bottles of three different laboratory chemicals, each chemical would need to be assessed as a separate waste.

Typical examples of mixed waste that can be assessed as a single waste include:

- **mixed municipal waste** from domestic premises
- mixtures of waste from **grit chambers** and **oil water separator contents**
- mixtures of, or separate fractions of **concrete, bricks, tiles and ceramics** 'containing hazardous substances', or 'other than those mentioned' Noting that any construction and demolition waste for which separate codes are specifically provided (e.g. asbestos containing materials, gypsum, etc) would need to be classified and assessed separately.

Step 2.2: Assess variability

General

Variability is normally a characteristic of a waste that cannot be changed without intensive manipulation.

Understanding the main components of variability in the population being sampled is required to design the testing programme.

Investigating and understanding the types of spatial and temporal variability is important as it allows that knowledge to be used to design the sampling plan to match the characteristics of the population. This increases the reliability of the results. For example:

- where variability is temporal, perhaps related to different feedstock, the waste could be divided into subpopulations on that basis, and/or
- where day to day variation in production differs more than variation within a single day, then sampling effort should focus on taking samples over many days rather than many samples on a single day

Spatial variability

Spatial variability is where one part of a waste differs from another. Most materials are heterogeneous in this way when considered in bulk. The spatial variability might arise from:

- the waste arising in physically different locations, e.g. three different containers
- temporal variation in the producing process, for example three different batches of filter cake in a single skip may differ due to the feedstock used
- a separation within in the waste, for example solids settling out in a container of liquid

The spatial variability is an inherent characteristic that will not change without manipulation (eg mixing a fluid that has separated into phases).

Within-stratum variability

This defines variability seen between samples taken from the same sub-population or strata, for example, the variation between samples taken from a single batch of filter cake.

Between-stratum variability

This defines the variability seen between samples taken from different sub-populations or strata, for example the variation between samples taken from three different batches of filter cake placed in a single skip or liquids that have separated into different layers. The distinction between within-stratum and between-stratum is most obviously relevant when the strata are in physically separate parts. However they are of equal relevance and importance to sequentially accumulated or arising material.

Temporal variability

Temporal variability can be considered in three main types, cyclic, driven and random.

- **cyclic -** the material exhibits a regular temporal pattern dependent on the time of day, day of week or time of year. For example municipal waste composition may include more packaging materials after Christmas and Easter.
- **driven -** the variability is 'driven' by known factors. For example, the composition of the output from a waste disposal process is dependent on the composition of the input waste received from each producer.
- **random -** this typically describes the net effect of a large number of smaller unknown factors that generate temporal variability that often cannot be accounted for. One of the technical goals of the sampling plan should be to identify the significant causes of temporal variability where they are unknown.

Step 2.3: Scale of sampling

The 'scale' is the amount of waste which a sample directly represents. For example, a sample taken from a drum may directly represent the material in that drum.

Depending on the circumstances the scale might be defined by:

- particle size in the waste
- the size of the population or sub-population, or
- in terms of time (a day, a month, a week, or a year)

There is a strong relationship between heterogeneity and scale. The heterogeneity is normally larger if the scale is smaller.

The scale defines the minimum quantity of material below which variations are judged to be unimportant. For that reason the scale chosen should be based on knowledge of potential heterogeneity in the waste, and care should be taken not to ensure that a large scale does not mask relevant smaller subpopulations. So for example if the scale of sampling of a skip of construction and demolition waste was 'a skip', then the skip should not contain any heterogeneity below that (e.g. coal tar or asbestos containing fragments in a skip of soil)

The results from sampling are only valid for a scale equal to or greater than the scale of sampling.

The following example illustrates this:

Example: A waste treatment process produces 10 x 1 tonne batches of filter cake that are placed in a skip:

- 5 batches of filter cake were produced from treatment of waste acid A, containing higher levels of heavy metals, and
- 5 from treatment of waste acid B containing lower levels of heavy metals

Basic (comprehensive) characterisation has already demonstrated that variation within any single batch of filtercake from the process is unimportant, and that waste acid is the only significant source of variation.

There are three different approaches that might be applied here:

i. sample the skip (scale = 10 tonnes, the population)
ii. sample the filtercake from the treatment of waste acid A separately from waste acid B (scale = 5 tonnes, 2 sub-populations identified)
iii. sample each separate batch of filter cake (scale = 1 tonne)

Option (i) provides information on the population, not on sub-populations. It assumes that there is no variation between batches of filter cake. In this instance the filter cake from acid A and acid B may be different. These should be viewed as different subpopulations, and a smaller scale used, until proven otherwise.

Option (ii) provides information on the population, and on the heterogeneity introduced by the two identified sub-populations. The scale is equal to the sub-population. This relies on the basic characterisation to confirm that source acid is the only significant source of heterogeneity.

Option (iii) is appropriate where the waste acid is not only variable, for example where a number of waste materials of varying quality are treated. It may be possible to focus and increase the scale of compliance check sampling later, if basic characterisation sampling provides more detailed information on heterogeneity that supports that approach.

The key point here is that scale and heterogeneity interact. The choice of scale must not make any assumptions about heterogeneity, and therefore mask sub-populations.

Step 3: Determine the practical instructions

The technical goals must be translated into practical instructions for those involved. This should include:

- choosing the statistical approach
- selecting the sampling approach
- determining the number type and size of samples
- identify sampling techniques

Step 3.1: Choose the statistical approach

This section discusses the statistical approaches applicable to, and the interpretation of results obtained from, sampling a waste.

The approach provided here is based primarily on:

- determining the mean concentration (or 50th percentile)
- calculating confidence intervals around that mean, and
- comparing the confidence intervals to hazardous waste thresholds

The confidence intervals are used to determine the reliability of the interpretation, and will generate three possible answers:

- the waste is reliably known to be hazardous
- the waste is reliably known to be non-hazardous, or
- the sampling has not provided a reliable answer and either the waste is classified as hazardous on a precautionary basis, or additional sampling is undertaken to provide a reliable answer

Four statistical approaches are provided to suit different circumstances as set out in Figure D2. These include:

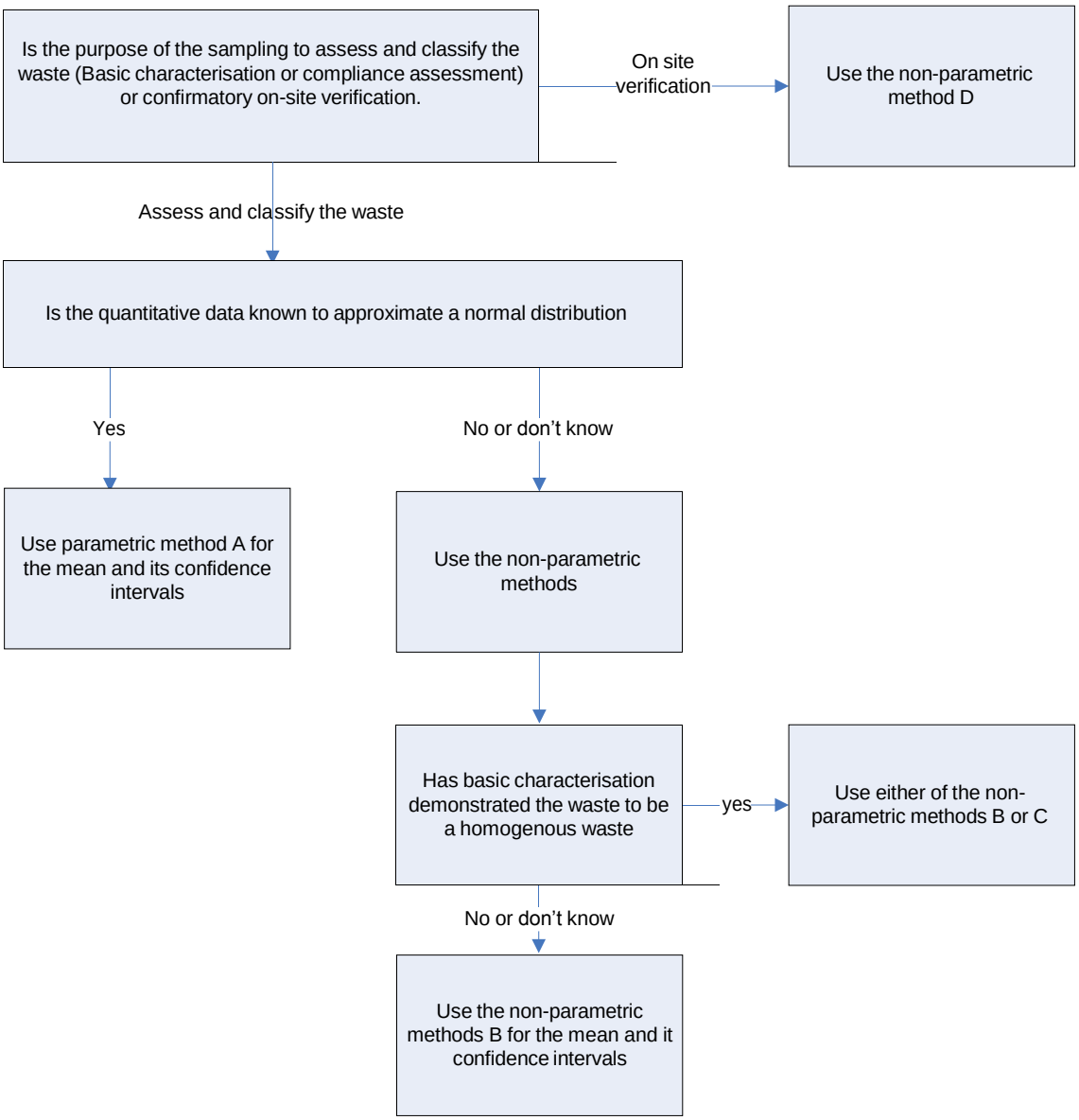
- a parametric method (where the data is normally distributed or approximates a normal distribution), and
- non-parametric methods (for use where this is unknown or is not the case)

Statistical tests may be used to determine if the data has, or approximates, a normal distribution.

As an alternative to using the statistics presented here the producer or holder may assume that a waste possesses a hazardous property if:

- any individual sample has exceeded the concentration limit for a hazardous property or persistent organic pollutant, or
- such a sample could reasonably be taken by another party, for example the regulator

Figure D2: Statistical approaches



Parametric method A - The mean and its confidence intervals

For simple, and particularly one-off, waste sampling scenarios the objective is to determine whether the concentration of hazardous substances in the waste is above or below the threshold.

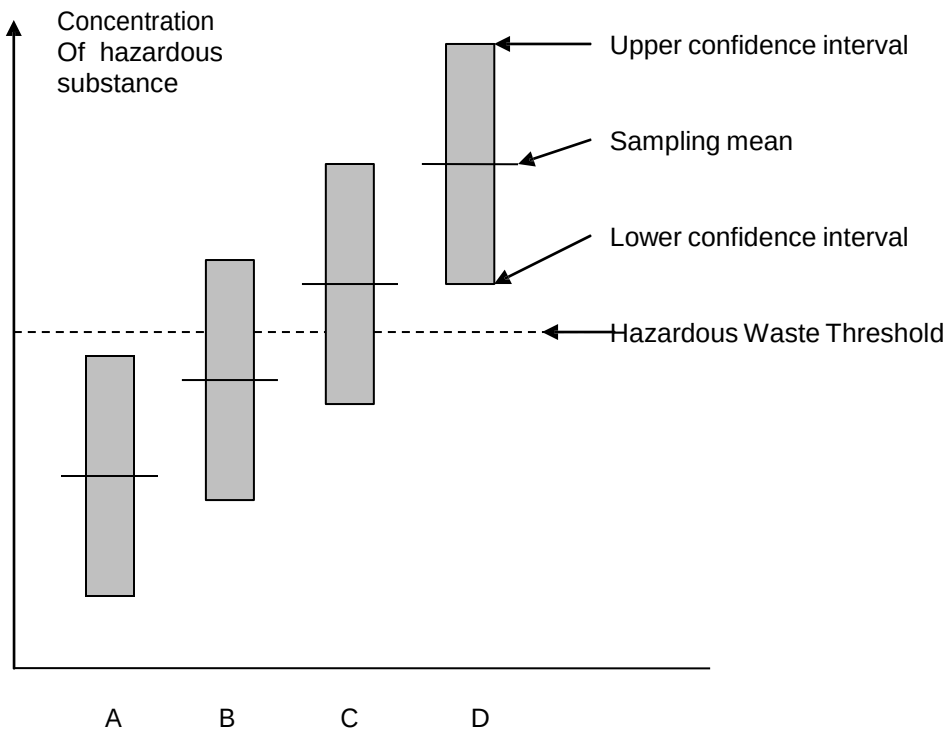
Waste can be heterogeneous so the concentration may vary from one part of the waste to another. The mean concentration in the waste (μ) is therefore the key criteria against which thresholds are considered.

Sampling generates a sampling mean ( ) which is an estimate of the actual population mean (μ). Like any estimate, there is a degree of uncertainty. This uncertainty is represented by the confidence intervals of the mean. This is the range in which the results suggest that additional estimates of the mean, from further sampling of the same waste, might reasonably fall. Or to put it another way, the range within which (μ) can be confidently be predicted to lie.

For hazardous waste purposes we need to be confident that the uncertainty associated with sampling mean ( ) does not span the threshold concentration. This would mean that μ could lie either side of the threshold, rendering the assessment inconclusive. Figure D3 illustrates this, and shows the sampling mean in relation to a hazardous waste threshold for four wastes (A to D):

- waste A does not possess the hazardous property because the upper confidence interval for the sampling mean ( ) is below the threshold - so. we can have confidence that the μ is below the threshold
- similarly Waste D does possess the hazardous property because the lower confidence interval for the sampling mean ( ) is above the threshold - sowe can have confidence that μ is above the threshold
- For Wastes B and C the uncertainty spans the threshold. The results are inconclusive and we cannot reliably determine whether the waste possesses the hazardous property or not. Further sampling of the same waste may reasonably produce sampling means on either side of the hazardous waste threshold.

Figure D3 | Statistical reliability of the sampling mean



The uncertainty of the mean is derived from the standard error (SE) of the mean calculated from the number of samples (n) and the standard deviation (s):

$$\frac{s}{(\sqrt{n})}$$

Therefore, to reduce the uncertainty, it is essential that the minimum number of samples (n) required to obtain a reliable estimate of the mean for a particular waste is determined prior to sampling.

The upper and lower confidence intervals for the mean are calculated from:

Sample Mean ± Margin of error (ME)

ME= SE x critical value of the t-distribution

The critical values of the t-distribution are determined using a one-tailed t-test using:

- (n-1) degrees of freedom
- probability = 0.95 / 0.05

This generates a 90% confidence interval (allowing for 5% above and 5% below the interval) around the sampling mean.

Where the upper 90% confidence interval is below the hazardous waste threshold we can be 95% confident that further sampling would not generate a sampling mean at or above the threshold, and that μ also lies below the threshold.

Example

A batch of filtercake produced by a waste treatment process has been sampled. The filtercake contains metal compounds A and B, both of which are classified as H410.

The producer has calculated that a minimum of 6 samples are required to give a reliable estimate of the mean.

The relevant hazardous waste threshold is 2500mg/kg for HP 14 Ecotoxic.

The results for the total concentration of metal compounds (A+B) are:

2600 mg/kg, 1600 mg/kg, 900 mg/kg,

1300 mg/kg, 1200 mg/kg, 1400 mg/kg

The sampling mean concentration ( ) = 1500

mg/kg The standard deviation = 587 mg/kg

n = 6

Standard error = 587 / √6 = 239

t-distribution criteria = (p=0.05), (n-1=5) = 2.015

Confidence interval of the mean

- 1500 ± (2.015 x 239)
- 1018 to 1982 mg/kg

The upper confidence interval of the mean (1982) is below the threshold (2500), so we can be confident that the estimate of the mean is reliable enough for us to conclude that the waste does not possess the hazardous property HP 14 Ecotoxic.

Non-parametric method B - The mean and its confidence intervals

Non-parametric methods are used when the nature of the statistical distribution is uncertain. They make no assumptions about the distribution and are consequentially less precise.

Rather than the sample mean used in the parametric method, this approach is based on the 50th percentile and its confidence intervals.

Sample results are ranked, with the lowest result assigned the rank (r) of 1, the second lowest the rank of 2 etc.

The 50th percentile (X_{50}) is estimated as follows:

$$X_{50} = X(r) \qquad \text{where } r = (50/100)(n+1) = (n+1)/2$$

For example where n= 11:

$$X_{50} = X(r) \qquad \text{where } r = (11+1)/2 = 6$$

X_{50} is therefore estimated by the sample with the rank of 6

If 'n' is an even number, r will not be an e act integer, and the following should be used.

$$X_{50} = \frac{X(r-0.5) + X(r+0.5)}{2}$$

For example where n = 12

where r = (12+1)/2 = 6.5

$$X_{50} = \frac{X(6.5-0.5) + X(6.5+0.5)}{2} = \frac{X_6 + X_7}{2}$$

X_{50} is therefore estimated by the average of the two samples ranked of 6th and 7th.

The 90% confidence intervals for the estimate of X_{50} are defined by the following cumulative binomial expression:

- r_1 is the largest integer satisfying the condition CumB(r_1-1; n, 0.5) ≤ 0.05
- r_2 is the smallest integer satisfying the CumB(r_2-1; n, 0.5) ≥ 0.95

These can be calculated easily on readily available spreadsheet software.

For example, where n = 11

r (column A)	**r-1** (column B)	**CumB** (Binomdist (column B,11,0.5,True))
1	0	0.0005
2	1	0.0059
3 (r_1)	2	**0.0327 (r_1)**
4	3	0.1133
5	4	0.2744
6	5	0.5000
7	6	0.7256
8	7	0.8867
9 (r_2)	8	**0.9673 (r_2)**
10	9	0.9941
11	10	0.9995

From the distribution of CumB, the:

- 3rd ranked sample is largest integer ≤ 0.05 (r_1), and
- 9th ranked sample is smallest integer ≥ 0.95(r_2)
- upper 90% confidence interval is set by the 9th sample
- lower 90% confidence interval is set by the 3rd sample

These confidence intervals should be interpreted as set out above for the parametric approach. Where the upper 90% confidence interval is below the hazardous waste threshold we can be 95% confident that the 50th percentile is below the hazardous waste threshold.

Further application of the non-parametric approach to compliance assessment (method C)

This section provides an alternative method for assessing the continuous homogenous output of a manufacturing process, or a homogenous waste divided into numerous containers. It is not applicable where different subpopulations may exist.

In these circumstances it is often reasonable to take few samples from many batches. The significance and reliability of any individual sample is then limited, however the information gathered on the population is significant.

Each sample is considered against the threshold criteria and noted simply as

- satisfactory (below threshold), or
- unsatisfactory (at or above threshold)

The overall population is then assessed on the number of satisfactory and unsatisfactory batches. Provided that 'n' is large enough (typically at least 20), this can be assessed using the cumulative binomial approach, considering whether we can be 95% confident that 10% or more of samples exceed the threshold.

For example if n= 20

No. samples satisfactory (Column A)	CumB (Binomdist(col.A,20,0.9,True))
0-12	0.0004
13	0.0023
14	0.0112
15	**0.0432**
16	0.1329
17	0.3230
18	0.6083
19	0.8784
20	1.0000

In this instance 15 or fewer samples, out of 20 samples, would need to be satisfactory before we could conclude with 95% certainty that at least 10% of samples exceed the threshold.

Where it is known with 95% certainty that 10% of the samples exceed the threshold, then the population is either:

- heterogeneous
- is too close to the threshold to be differentiated from it by this test, or
- is hazardous

In any event further investigation to determine which, and where relevant to identify hazardous sub-populations, would be necessary. A non-hazardous classification could not reliably be assigned.

If 'n' is small the statistical power of the test will be insufficient for assessment purposes and the non-parametric approach using 50th percentiles should be used instead.

This approach would not normally be applicable to outputs from waste management processes due to the variation in input quality and composition.

Application of the non-parametric approach to on-site verification checks (method D)

Statistically the reliability that can be attached to on-site verification checks at any point in the waste chain, for example at the producer or consignee, can be calculated.

This approach is most applicable to presence/absence or pass/fail type criteria, for example whether containers hold non-conforming or conforming waste.

Permitted sites typically have permit conditions, for example relating to permitted waste types that are absolute. They are either allowed to treat a waste or they are not.

In addition on a consignment note they are required to legally certify the nature and quantity of the waste received, how they intend to manage it, and that they are authorised to do so.

The 100% 'absolute' can be assessed statistically, with a virtually equivalent level of protection, using a 99% as the compliance level.

For example, to achieve a 95% confidence that 99% of the containers received do not have characteristic X, the number of containers that would have to be checked can be derived using a cumulative binomial calculation.

The lower 90% confidence interval for true population compliance is given by:

- P_{LO} is chosen so that 1-CumB(r-1; 0.99, n) = 0.05

Where:

- r = number of satisfactory containers
- n = number of containers checked

In practice this means that as long as all containers checked are satisfactory, 299 containers is the value of (n) required to give 95% confidence that 99% compliance has been achieved. So, where the number of containers received is:

- <299, all would need to be checked, or

- ≥299, then no more than 299 would need to be checked

This number changes significantly however if checks identify any non-conforming waste, as this affects the value of 'r'.

This number can only be applied to a single population (or sub-population where one exists) of waste, which might for example be all drums of a specific waste received from a single producer in a year, rather than all the different inputs to a site over that period.

Hazardous substances and hazardous properties

Each sample should be assessed to determine the concentration of hazardous substances relevant to each hazardous property.

Some hazardous properties may add the concentrations of relevant hazardous substances together (e.g. HP 4 and HP 8, HP 5 and HP 6, and HP 14). The same must be done for each sample prior to the results being interpreted using the statistical tests given here. So a sample that contains 500 mg/kg of chemical A and 1,500 mg/kg of chemical B would be interpreted as containing 2000 mg/kg for an additive hazardous property.

Other hazardous properties consider the concentration of each hazardous substance in isolation (e.g. HP 7, HP 10 and HP 11). However where a waste contains more than one relevant hazardous substance you may get the situation where:

- sample 1 contains 1500 mg/kg of chemical A and 500 mg/kg of chemical B with the same hazard statement code, and
- sample 2 contains 500 mg/kg of chemical A and 1500 mg/kg of chemical B

In this instance the results for that hazardous property are interpreted using the highest concentration of chemical with that hazard statement code e.g. chemical A for sample 1, and chemical B for sample 2.

Reliability of sampling results

The objective of designing the sampling plan is to ensure that the results identify, with a high degree of statistical confidence (reliability), that a waste is a hazardous waste or not.

The closer the levels of hazardous substances in the waste are to hazardous waste thresholds, and the more variable they are the greater the need for reliability. Conversely reliability is perhaps less important where the composition is consistently well above or below thresholds.

To achieve reliable conclusions:

- sufficient samples have to be taken to address heterogeneity
- the sampling plan will need to be more robust where the range of hazardous substance concentration in the samples spans a threshold
- subpopulations need to be identified and sampled separately

If it is not possible to prove with a high degree of statistical reliability that a waste is non-hazardous, then either:

- further sampling should be undertaken to increase the statistical reliability of the conclusion, or
- the material should be classified as a hazardous waste to provide the greatest degree of protection of human health and the environment.

The sampling plan often has to balance achievable reliability and the cost of sampling. An initial basic characterisation exercise may inform this balance.

Confidence Intervals - Probabilistic sampling (see D4.2) allows a confidence interval (or error band) to be calculated. This identifies the range around the estimate, with a certain degree of confidence, within which the true value of the waste falls. The narrower the confidence interval the better the sampling estimates the true value of the population. The size of the confidence interval depends upon:

- the heterogeneity of the population or sub-population sampled
- the number of samples taken, and

- the desired confidence interval

The more confidence needed, the wider the confidence interval

Precision is the semi-width of the confidence interval, and depends on the desired degree of confidence, variability in the population or subpopulation, sampling pattern, chosen number of samples, and assumed probability distribution of the population.

The key benefit of being able to estimate the achievable confidence and precision associated with a proposed testing programme is that it forms the link with the number of samples taken and the reliability of the answers they produce.

Systemic error (Bias): a persistent tendency to either under-estimate or over-estimate the parameter due to the approach adopted. A risk where a sub-population is sampled and assumed to be representative of the population, for example where:

- only the surface of a waste is sampled, or
- sampling is restricted to daytime, when a process operates at night as well

Random error: The sample differs from the population as it is small fraction of the population, and its composition being determined to varying degrees by chance.

Statistical sampling error: The difference between the answer obtained by sampling a proportion of the waste and the one that would have been obtained if the entire population had been sampled. This may result from systemic and/or random error.

Physical sampling error: The sampling method introduces a systemic or random error, for example if it favours the inclusion or exclusion of large or small particles.

Analytical error: Errors that arise during laboratory analysis. An accredited laboratory should be able to provide a reliable estimate of the random component of analytical error, and an upper limit of the possible systemic error or bias. A systemic error might be introduced where preparation and analysis of the sample resulted in loss of (or failure to detect) some of the hazardous substance, leading to an underestimate unless corrected.

Analytical results reported by an accredited laboratory, in accordance with their quality control systems, should not be excluded as outliers. If the result is in any doubt additional sampling should be undertaken to investigate it.

Step 3.2: Select the sampling approach

Types of sampling

There are two approaches to sampling are **probabilistic** and **judgemental.**

Probabilistic sampling has an equal chance of sampling any individual part of a waste, and implies that the entire population is accessible for sampling. The approach enables the reliability of the resulting conclusions to be quantified statistically. For that reason the sampling plan for waste classification and hazardous waste assessment should be based wherever possible on probabilistic sampling.

Judgemental sampling is where part of the waste is excluded from sampling (non-probabilistic) or has a reduced chance of being sampled (partially probabilistic). Examples of where judgemental sampling might need to be considered are:

- to target a specific item or component of the waste, or
- where probabilistic sampling of the entire population is practically impossible given time, resources or money

The consequence of judgemental sampling is that it generates information a sub-population that cannot be relied upon to be representative of the population or as reliable as probabilistic sampling. These uncertainties mean that the usefulness of results from judgemental sampling is dependent on the reliability of the waste material background information on which any expert judgement and ultimately the sampling plan is based. The limitations are particularly significant in a new sampling situation where background information is weak or where basic characterisation has not been performed.

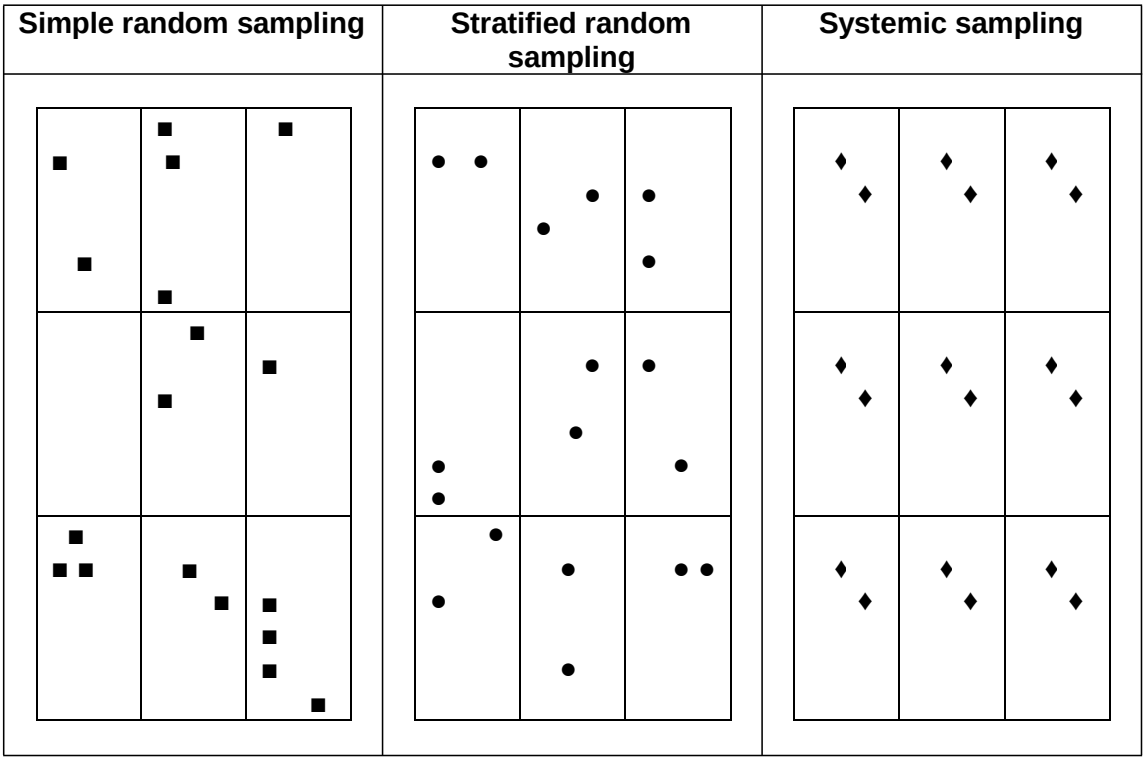
Where judgemental sampling is used the technical arguments for doing so, instead of probabilistic sampling, must be set out in the sampling plan and such sampling should approximate probabilistic sampling as much as possible. Any assumptions relating to un-sampled sub-populations should be supported by evidence to justify this approach.

Sampling pattern

The sampling pattern defines when, where and how the samples of the population are taken. Various types of sampling patterns are, discussed below and illustrated in Figure D4 and D5

- **Simple random sampling (probabilistic):** In 'simple random sampling' the samples are taken at random from the population. Every part of the population has an equal chance of being sampled, but the spread across the population may not be even. This method of sampling may not be appropriate where the population can be divided into sub-populations or strata.
- **Stratified random sampling (probabilistic):** In 'stratified random sampling' the population is divided into sub-populations or strata, and a specified number of samples taken randomly from each. If each stratum is the same size, or the number of samples is weighted relative to strata size, every part of the population has an equal chance of being sampled and sampling is spread evenly across the population. In some instance it may be appropriate to take equal numbers of samples from each stratum, regardless of size, and then weight the results.
- **Systemic sampling (probabilistic):** In 'systematic sampling' the samples are evenly spread across the population, starting from a randomly chosen point for example sampling every Tuesday. Although this does ensure that each part of the population has an equal chance of being sampled, it assumes that there are no systemic components of variation within the population that interact with the sampling frequency. If this assumption is incorrect the approach is not valid. For example the outputs from a waste disposal process may vary depending on the feedstock that is collected on a regular schedule. For that reason this approach should be applied with considerable caution, and such assumptions tested.

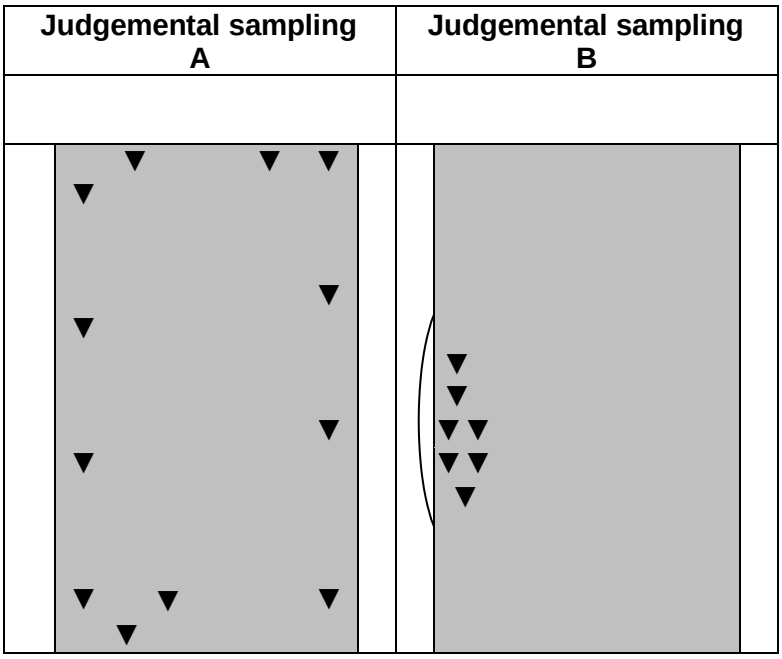
Figure D4 | An Illustration of probabilistic sampling patterns



Judgemental sampling

A wide variety of sampling patterns can be generated by judgemental sampling, differing in how far they are from a probabilistic approach.

Figure D5 | An illustration of judgemental sampling patterns



Example A shows systemic sampling from the edge or surface of the population, which becomes a subpopulation. This allows statistical parameters and confidence to be determined for the subpopulation. Application to the population depends on whether the subpopulation has been proven to be representative or not.

Example B shows sampling from a specific place, for example an access point. It provides no information about either the population or the sub-population, except in the vicinity of where samples were taken. Nothing can be reliably concluded about the hazardous waste assessment of the population. This approach might be valid in some situations, for example to specifically investigate an atypical material identified in that location.

Step 3.3: Determine the type, number and size of samples required

A **sample** is a quantity of waste obtained from a single sampling action that is analysed as a single unit.

A **composite sample** is a collection of **increments,** each obtained from a single sampling action, that are combined to form a single unit for analysis.

The sampling plan must contain specific instructions on the type of samples to be taken, the size of increments and/or samples, the number of increments/samples and the number of increments in any composite sample.

Determination of the number of increments and/or samples

The number of increments and samples is dependent on the:

- objective
- variability of the material, and
- desired precision and confidence

A preliminary sampling exercise will often be needed to provide a reliable estimate of variability to fulfil the requirements for precision and confidence.

The use of composite versus individual samples

Using many samples gives you:

- an estimate of the mean, and
- information on the variability/heterogeneity of the material

Using a composite sample, generated from taking multiple increments, gives you:

- an estimate of the mean, but
- **not** the variability

Taking a small number of samples provides only an approximate indication of the quality of the material.

The two approaches can be combined in some circumstances.

Determine the required number of increments and samples

This section considers how many samples and increments are required to reliably estimate **a mean concentration** and **confidence intervals** for the purposes of hazardous waste assessment.

These calculations require that a number of parameters are estimated in advance. In some cases it may be appropriate to use values from past analysis of sample data from similar investigations. The alternative would be to conduct an initial investigative study to generate the estimates.

Underestimating these parameters can increase the risk of an unreliable result from the sampling exercise.

Number of individual samples

The **number of individual samples** (n) required to estimate the mean with the necessary confidence and precision are calculated as follows:

$$n = (u_a/d)^2 (\sigma_s^2 + \sigma_e^2)$$

where,

- u_a = the standard normal deviate corresponding a confidence of 95% (1.96)

and where, in mg/kg

- d = the desired precision
- σ_s = standard deviation of total spatial and/or temporal variation (= $\sqrt{[\sigma_w^2 + \sigma_b^2]}$)
- (σ_w = standard deviation of local spatial variation)
- (σ_b = standard deviation of spatial or temporal variation)
- σ_e = standard deviation of the analytical error

The desired precision (d) is affected by how close the level of hazardous substances is to a relevant threshold concentration. The closer it is, the greater the level of precision that will be needed to distinguish the two. The desired precision should always be less than the distance between the level of hazardous substance(s) and the relevant threshold.

Example:

A manufacturing process generates ten batches of granular waste containing a single hazardous substance X, a category 1A carcinogen, with a threshold of 1000 mg/kg.

Due to the process controls and consistent quality specification of raw materials used this is considered to be a single population.

Analysis of previous batches allows the following estimates to be made

- Previous levels of hazardous substance X have been 500-800 mg/kg
- σ_s is estimated to be 50 mg/kg
- σ_e is estimated to be 25 mg/kg
- precision is selected as 50 mg/kg since the mean may be close to the threshold.

u_a = 1.96 for 95% confidence

$n = (1.96/50)^2(50^2+25^2) = 4.8$

So a minimum of five samples are needed.

The operator decides to adopt a probabilistic stratified random sampling approach, using the ten batches as the stratification, and takes a single sample randomly from each batch. Ten samples in total.

Using this approach the operator can expect to be at least 95% confident that the mean concentration of hazardous substance X in the waste is within 50mg/kg of that measured by the ten samples.

This also enables them to check their estimates of standard deviation for use in future assessments.

Number of composite samples and increments

A single composite sample, made up of several increments, can provide a more reliable estimate of the mean than an individual sample. However it cannot provide an estimate of the confidence interval around that mean that are needed for hazardous waste assessment. More than one such sample will normally be needed.

Multiple composite samples can serve the same purpose as several individual samples to provide an estimate of this. For example, in the preceding example a single composite sample could have been taken from each of the ten batches.

The number of composite samples and increments required to estimate the mean concentration of a hazardous substance(s) in a waste to a specific precision and confidence can be calculated.

The level of confidence should be at least 95%.

The level of precision required will depend on how close the mean is believed to be the threshold. The closer the mean value is to the threshold the greater the need for precision.

In general, the precision should be less than the distance between the mean and the threshold to be confident that the population mean is below the threshold.

For example if the estimate of the mean concentration is 950 mg/kg, against a threshold of 1000 mg/kg, then a precision of no more than 49 mg/kg is required.

The **number of composite samples** (n) is calculated as follows:

$$n = (u_a/d)^2 \left(\frac{\sigma_w^2}{m} + \sigma_b^2 + \sigma_e^2\right)$$

Where:

- u_a = the standard normal deviate corresponding a confidence of 95% (1.96)

and where, in mg/kg:

- d = the desired precision
- σ_w = standard deviation of local spatial variation (within the composite sample)
- σ_b = standard deviation of spatial or temporal variation (between composite samples)
- σ_e = standard deviation of the analytical error

The **number of increments** (m) in each composite sample is calculated as follows:

$$m = \frac{\sigma_w^2}{[n(d/u_a)^2 - \sigma_b^2 - \sigma_e^2)]}$$

The relative cost of sampling per increment and analysis per sample can be used to consider the various combinations of n and m that deliver the necessary confidence and precision.

$$\text{Total cost} = (Am + B)n$$

Where:

- A = cost of sampling per increment, and
- B = cost of analysis per composite sample

Estimating the 50th percentile for non-parametric tests

The number of samples determines the precision with which percentiles can be estimated.

The number of samples required to estimate the 50th percentile with 95% confidence can be calculated from:

$$n = 1.3 \quad [\ (u_a s/d)^2 (1+u_p^2/2)\ ]$$

Where:

- u_a = the standard normal deviate corresponding to a confidence of 90% (1.65)
- u_p = the standard normal deviate corresponding to the cumulative probability p=50% (0.68).
- s = an estimate of the standard deviation.

and where, in mg/kg:

- d = the desired precision

$$n = 1.3 \times [\ (1.65s/d)^2(1+0.68^2/2)\ ] = 1.3 \times 1.2312 \times (1.65\ s/d)^2$$

$$\mathbf{n = 4.4 \times (s/d)^2}$$

In practice this means that a waste with a standard deviation that is relatively large, compared to the precision, will need more samples taken to determine the 50th percentile with precision.

Estimating a percentage compliance with a given limit

The number of samples required to determine (non-parametrically) percentage compliance with a given limit can be calculated in a manner similar to D4.3.6

Determine the increment and sample size (mass/volume)

The relationship between minimum sample size, minimum increment size and the number of increments per composite sample allows the actual increment or sample size to be calculated.

The actual size of an individual **sample** must exceed the minimum sample size and provide enough material for analysis.

For each **composite sample**:

- the size of each **increment** must equal or exceed the minimum increment size, **and**
- the sum of **increments** must equal or exceed the minimum sample size - the increment size may need to be increased to achieve this

The size of increments and samples will depend on:

- the quantity of material required by the laboratory for analysis
- the number of increments in the composite samples
- the relation between minimum increment size and minimum sample size, and

- the nature of the material

Probabilistic sampling relies on all parts of the population having an equal chance of being sampled. The sample must therefore be big enough to exclude errors caused by the fundamental variability (rather than heterogeneity) in the material generated by differences between individual particles within the waste.

The sample/increment must be big enough to accommodate all particle sizes.

For **liquids,** where differences are at a molecular level, the minimum sample and increment size is not normally affected by the nature of the material.

For **powders and sludges,** as the particulates are small and as long as sampling allows entry at all particulates present and captures any liquid, the same is true. The large number of particles makes the difference between them of minimal significance.

For **particulate and granular material** the nature of the material means that individual particles can have a substantial effect on sample composition. The minimum sample and increment size need further consideration:

- the diameter (d) of the largest particle should be determined
- the aperture of the sampling device must be at least 3 x d to allow simultaneous entry of all particles or granules in the material
- the volume of the sample or increment should be at least $27d^3$

Determination of minimum increment size

Maximum particle size can be based on the upper 95th percentile of particle diameter (D_{95}).

Where the maximum particle size is < 3mm, the actual width, height and length of the sampling equipment must be ≥ 10mm. The minimum mass of the increment is then given by:

$$\text{Mass (kg)} = 1 \times 10^{-6} \times \rho$$

Where = the density of the waste in kg/m^3

Where the maximum particle size in the waste is ≥ 3mm. The actual width, height and length of the sampling equipment must be at least three times the maximum particle size. Where this is the case then the minimum mass of the increment is given by:

$$\text{Mass (Kg)} = 10^{-9} \times \rho \quad (3D_{95})^3 = 2.7 \times 10^{-8} \times \rho \times D_{95}^{\ 3}.$$

Where D_{95} = maximum particle size in **mm.**

Determination of minimum sample size

Although dependent on the quality of assumptions made and the approximation required to apply this to non-spherical particles, the minimum sample size can be estimated from:

$$\text{Mass (g)} = \frac{1}{6}\pi \quad (D_{95})^3 \times \rho \times g \times \frac{(1 - P)}{CV^2 \times P}$$

Where:

- ρ = the specific mass of the particles in the material in g/cm^3
- D_{95} = maximum particle size in **cm**
- g = the correction factor for particle size distribution based on D_{95}/D_{05}

  (broad particle size distribution - D_{95}/D_{05} is > 4 cm, g = 0.25)

  (medium particle size distribution - D_{95}/D_{05} is >2 but ≤ 4, g = 0.50)

  (narrow particle size distribution - D_{95}/D_{05} is >1 but ≤ 2 cm, g=0.75)

  (uniform particle size distribution - D_{95}/D_{05} = 1, g =1)
- P = is the fraction of the particles with a specific characteristic

- CV = desired coefficient of variation cause by the fundamental error and is calculated from $CV^2 = (1-p)/(pn)$ (where n=number of samples). (0.1 is an accepted value of CV where the fundamental variability in the waste is low)

For sampling a fine granular material, where the influence of fundamental variability is low, and with a broad particle size distribution, the following default equation can be used.

$$\text{Mass (g)} = \frac{1}{6}\pi \quad (D_{95})^3 \times 2.6 \times 0.25 \times \frac{(1 - 0.02)}{0.1^2 \times 0.02} = 1668 \times (D_{95})^3$$

Step 3.4: Identify sampling techniques

Identifying the most appropriate sampling technique

Provision of full guidance on this aspect is beyond the scope of this document.

The sampling plan should identify:

- the techniques and equipment to be used to take the sample, and the consequences of deviating from this
- any requirement to produce composite samples from incremental samples and for sub-sampling in the field to produce the laboratory sample, and the methods to be used to do so
- the procedures to be used for packaging, preservation, storage and transport of the sample to the laboratory

Appropriate consideration should be given to the following Technical Reports.

Guidance on sampling techniques (PD CEN/TR 15310-2:2006)

This report provides detailed advice on the sampling of different waste materials in different circumstances.

This includes, for example, the following materials:

- mobile or viscous liquids
- sludges or paste-like substances
- powders granules and small crystals
- coarse or lumpy solids

In the following circumstances:

- drums, bags, kegs, blocks, cask or small or flexible walled containers
- vertical uniform or irregular, or horizontal cylindrical tanks
- moving liquids in a pipeline
- lagoons or pits
- hoppers, heaps, stockpiles and silos, falling streams and band or screw conveyors, and
- massive or large pieces

Guidance on procedures for sub-sampling in the field (PD CEN/TR 15310-3:2006)

This report provides guidance on procedures to reduce the overall size of a sample, in the field, primarily to aid transport to the laboratory.

Guidance on procedures for sample packaging, storage, preservation, transport and delivery (PD CEN/TR 15310-4: 2006)

Sample integrity may be compromised if the sample is incorrectly packaged, stored, preserved or transported. The results obtained may not be representative of the waste.

The procedures required are likely to dependent on the nature of the waste in questions, the properties of the hazardous substances of concern, and the analytical requirements of the laboratory.

Those involved in the transport of samples should be aware of any waste documentation (transfer notes or consignment notes) that may be required by legislation.

Samples should be transported in a manner that does not cause deterioration. It is advisable to check with the chosen analytical laboratory that the packaging, transportation and storage procedures are appropriate to protect the integrity of the sample. CEN/TR 15310-4 provides guidance on sample packaging, storage, preservation, transport and delivery. Requirements for these should be documented in the sampling plan.

Packaging and labels

The sample container opening should be of the appropriate size for the material to be packaged. The samples must be packed such that they are protected from potential reactions with the packaging or light, deterioration (perhaps through moisture loss or gain) or contamination.

The packaging should be of suitable size for transportation and reception by the analytical laboratory. Consideration should be given to health and safety restrictions that could influence the size of the packaging.

Analytical laboratories should be able to provide advice on requirements recommended for designated tests.

All sample containers should be marked with a unique identifier that is recognisable to the sampler and the laboratory. This should be done in the manner identified in the sampling plan. A chain of custody form should be completed for each sample and sent with the sample to the analytical laboratory.

Preservation

Depending on the nature of the material, the time between sampling and analysis should be minimised to avoid deterioration or contamination of the sample. It is advisable to discuss and agree the requirements with the analytical laboratory prior to sampling.

Step 5: Define and document the sampling plan

The preceding steps should be considered and documented in the sampling plan.

An example sampling plan is provided as Figure D5. The size and content of each information field should be adapted and expanded to incorporate any relevant information as necessary. The size of a field in the example should not be taken as an indication of the level detail required.

Step 6: Subsequent steps

Taking the sample

Sampling should be taken in accordance with the sampling plan. Any deviations from the sampling plan should be documented on the sampling record.

Observations made during sampling should also be recorded. These can be useful when interpreting the results.

Analytical methods

The approach must be consistent with that set out in Appendix C of technical guidance WM3.

The analytical laboratory (whether in-house or external provision) should, wherever possible, be accredited by the United Kingdom Accreditation Service (UKAS) (or equivalent) to BS EN ISO/IEC 17025 ‘General requirements for the competence of testing and calibration laboratories’ for the scope of the work.

A competent laboratory will be able to give advice on which analytical and test methods should be chosen to meet the sampling objective.

Sample records

To have traceability there must be records and documentation. All documentation must be traceable to the sampling plan.

BS EN 14899:2005 lists the following documents, examples of which are given in Annexes A and B of the Standard:

- **Sampling plan** – The instructions on how the take the sample. Completed by the waste producer in consultation with relevant parties
- **Sampling record** – A record of changes to the agreed sampling plan. Completed by the sampler
- **Chain of custody form** – A record completed by the sampler, carrier and analytical laboratory
- **Sample analysis request form** - Completed by the sampler

Analytical test methods often have specific record and reporting requirements. For example Test Method Regulation 440/2008 indicates the requirements for some test methods used for hazardous waste assessment. Test reports must contain details of sample preparation as well as the reference to the sampling plan.

In addition to test results, the test report should include at the following information as a minimum:

- description and identification of the laboratory sample
- which processes, procedures and apparatus were used
- results of the determination expressed in the appropriate units
- any details not specified in the Standard or which are optional, and any other factors which may have affected the results
- date of receipt of laboratory sample and dates(s) when the test was carried out
- reference to the standard or procedure followed

Figure D5 | Example sampling plan (adjust field size to suit information)

Sampling plan for waste classification and assessment

Sampling plan name / ref.

Date prepared:

Prepared by: Prepared for:

Preparatory steps

Involved parties:

Objectives :	Technical goals:

Background information researched:

- site details
- process or nature of arising
- type, form and amount of material
- known physical, biological or chemical characteristics
- operational procedures that may affect characteristics
- previous investigations or analysis

Determine level of testing required:

Constituents to be tested:

Health and safety precautions, and access restrictions:

Technical Goals

Define • populations, and • subpopulations	
Variability and causes: • spatial, • temporal	
Scale of sampling	

Practical instructions and sampling methodology (CEN/TR 15310-1&2)	
Name and Organisation of sampler	
Other parties present during sampling (name and organisation)	
Statistical approach to be used	
Sampling approach and pattern (including justification)	
Identify sampling place and points	
Sampling equipment needed	
Sampling equipment to be used	
Sample details • individual or composite • number of samples / increments • size of samples / increments	
Requirements for sample reduction	
Requirements for on-site determinations	
Sample ref. number methodology	
Anticipated restrictions or limitations that may impact on data reliability	
Sub-sampling (CEN/TR 15310-3)	
Detail procedure used (if applicable)	
Packaging, preservation, storage, and transport requirements (CEN/TR 15310-4)	
Packaging (type, size, material considering risk of adsorption/reaction, cleaning etc.)	
Preservation (samples shall be packed and transported in such a way that their condition at the time of sampling is preserved)	
Storage	
Transport method	
Transport company details: Contact: Delivery date:	
Analytical laboratory	
Company details : Contact name:	