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Waste Classification

Guidance on the classification
and assessment of waste (1st edition 2015)

Technical Guidance WM3

SEPA
Scottish Environment Protection Agency

NIEA
www.ni-environment.gov.uk
Northern Ireland Environment Agency

Cyfoeth Naturiol Cymru
Natural Resources Wales

Environment Agency

Publishing Organisations

Natural Resources Wales / Cyfoeth Naturiol Cymru,
Tŷ Cambria,
29 Newport Road,
Cardiff,
CF24 0TP.

Tel: 0300 065 3000

www.naturalresourceswales.gov.uk

Scottish Environment Protection Agency (SEPA),
SEPA Corporate Office,
Erskine Court,
Castle Business Park,
STIRLING,
FK9 4TR.

Tel: 01786 457700
Fax: 01786 446885

www.sepa.org.uk

Northern Ireland Environment Agency (NIEA),
Land and Resource Management Unit,
Klondyke Building,
Cromac Avenue,
Gasworks Business Park,
Lower Ormeau Road,
Belfast,
BT7 2JA.

Tel: 028 90549710
Fax: 028 90549310

www.ni-environment.gov.uk

Environment Agency,

Horizon House,
Deanery Road,
Bristol,
BS1 5AH.

Tel 03708 506506

www.environment-agency.gov.uk

Document History

First Edition : January 2015

Adapted from the third edition of technical guidance WM2.

Contents

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
~~**CHIP**~~	~~Chemical (Hazard Information for Packaging and Supply) Regulations~~
CFC	Chlorofluorocarbon
CLI	Classification and Labelling Inventory
CLP	Classification, Labelling and Packaging of Substances Regulation (EC 1272/2008)
~~**DPD**~~	~~Dangerous Preparations Directive (1999/45/EC)~~
~~**DSD**~~	~~Dangerous Substances Directive (1967/548/EC)~~
EC	European Community
ECHA	European Chemicals Agency
ECVAM	European centre for the validation of alternative methods
EEC	European Economic Community
ELV	End of Life Vehicle
~~**ESIS**~~	~~European Chemical Substances Information System~~
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
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

What is this document about?

This document is comprehensive technical guidance on the assessment and classification of waste.

The document explains how to identify the correct classification code for a waste, and how to assess whether or not a waste has a hazardous property.

Who is it intended for?

This document is intended for anyone involved in the production, management and regulation of waste.

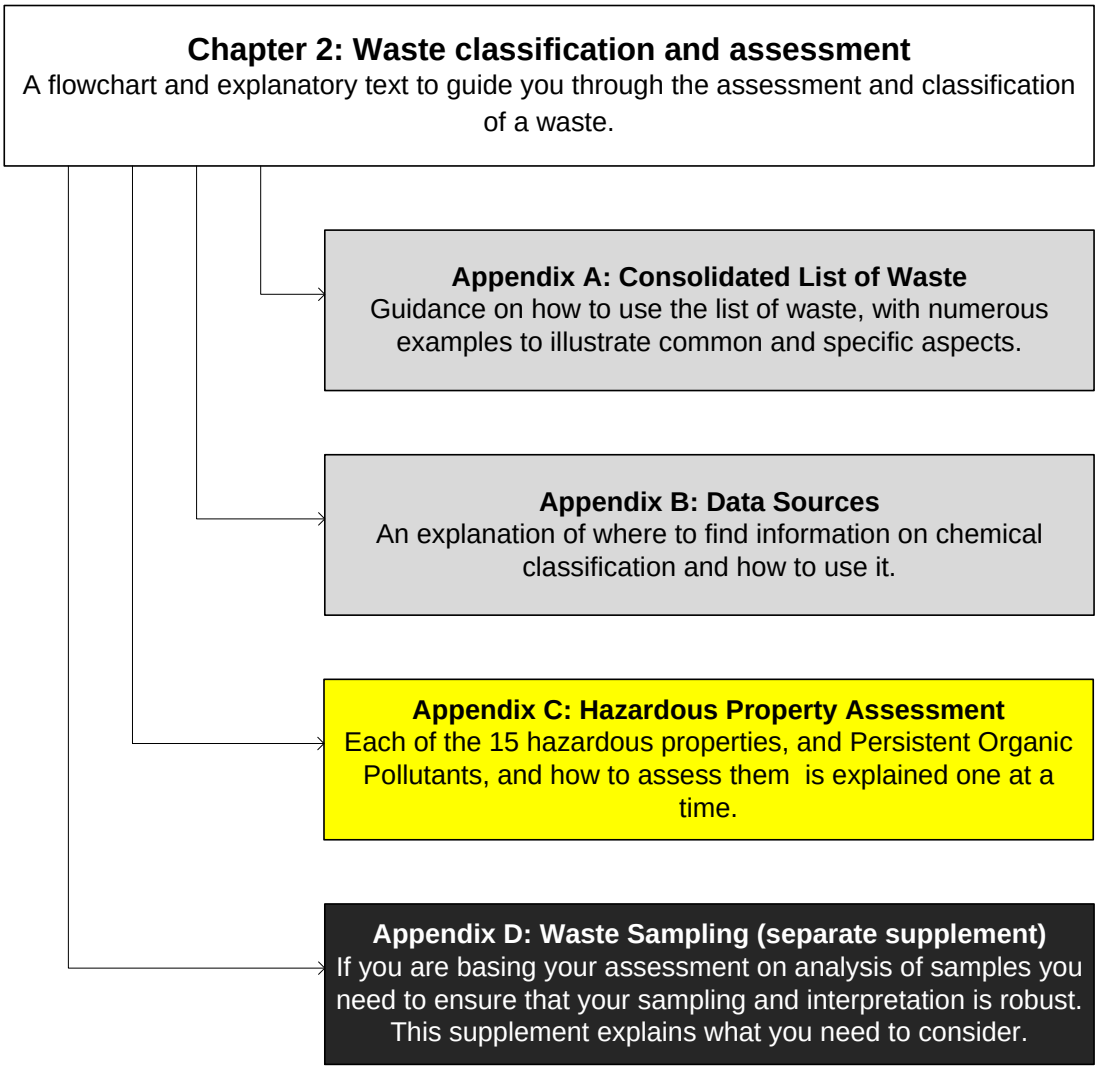
This document is a comprehensive reference manual. Competence in hazardous waste, and some chemistry knowledge, is needed to make full use of all aspects.

If you are inexperienced in hazardous waste, or lack the necessary knowledge of chemistry, you should seek advice before using this document.

How is the information presented?

The document is built around chapter 2: Waste classification and assessment.

Each of the four Appendices A, B, C and D provide supporting information on a specific aspect of that assessment. This is illustrated below:



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Legal background

1.1 The Waste Framework Directive

The Waste Framework Directive (2008/98/EC)[1] (WFD) sets out what waste is and how it should be managed. The WFD considers some wastes to be hazardous waste.

A hazardous waste is defined as a waste that has one or more of the fifteen specified hazardous properties listed in Annex III to the WFD. The application of this is determined by the List of Wastes Decision.

1.2 The List of Wastes Decision

The List of Wastes Decision (2000/532/EC)[2] (LoWD) provides:

- a list of wastes (LoW), often called the European Waste Catalogue;
- the rules for using the list
- the criteria used to assess if a waste on the list is hazardous

The WFD and LoWD use the classification of product chemicals as the basis for the assessment of hazardous waste.

1.3 Chemicals legislation

The classification system for chemicals is set out in European Regulation (EC) No. 1272/2008 on classification, labelling and packaging of substances and mixtures[3] (CLP).

The CLP Regulation applies the United Nations' Globally Harmonised System (GHS) on the classification and labelling of chemicals (GHS) across all European Union countries, including the UK.

1.4 Domestic legislation

The WFD and the LoWD are implemented in England, Northern Ireland, Scotland and Wales using different domestic regulations. This document provides a common technical basis for applying the definition of hazardous waste in the UK.

Further information on each country's regulations can be found on the website of each Agency[4].

[1] http://ec.europa.eu/environment/waste/framework/framework_directive.htm

[2] Commission Decision 2000/532/EC as amended by 2001/118/EC, 2001/119/EC and 2001/573/EC. A consolidated version can be found at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2000D0532:20020101:EN:PDF

[3] ec.europa.eu/enterprise/sectors/chemicals/documents/classification/

[4] Scotland: www.sepa.org.uk/waste/waste_regulation/special_waste.aspx, England and Wales: https://www.gov.uk/dispose-hazardous-waste, Northern Ireland: www.doeni.gov.uk/niea/waste-home/regulation/regulations_hw.htm

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Waste classification and assessment

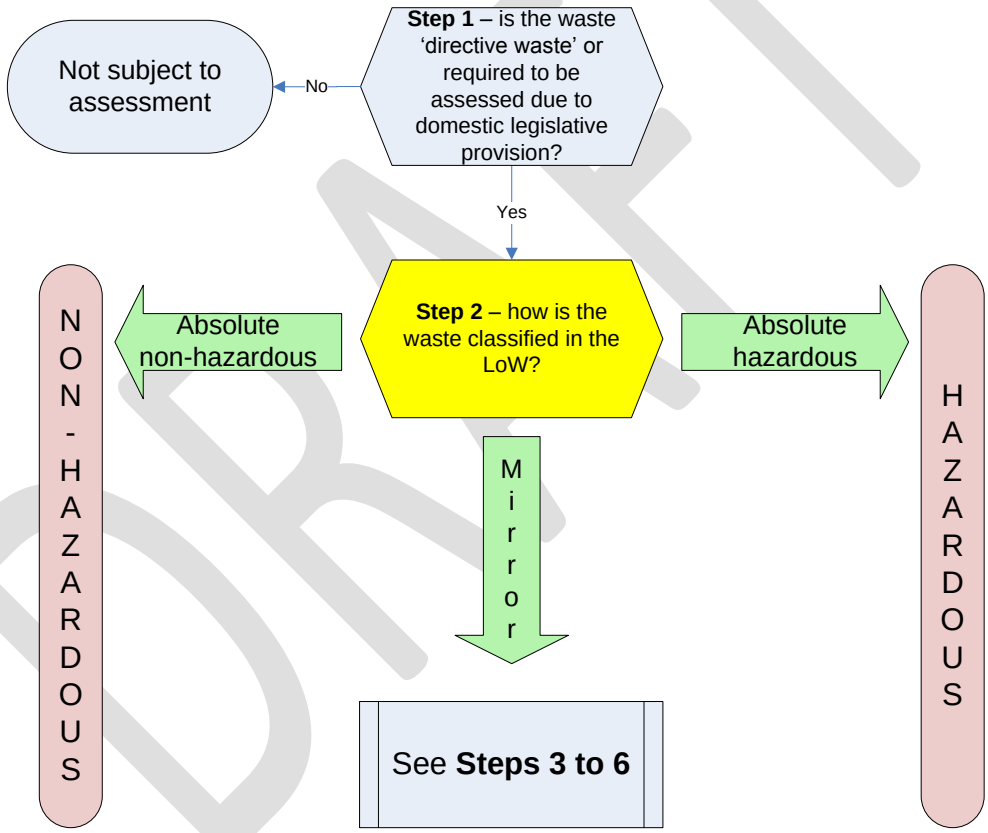
2.1 Waste classification and assessment methodology

Waste classification is a multi-stage process involving the assessment of hazardous properties, assignment of list of waste codes, and identifying whether a waste is hazardous or not. The flowcharts and supporting text below can be used to support this process. The flowcharts must be used with the supporting text.

2.2 Assigning the List of Waste codes to Directive Waste

Flowchart 2.1 and the supporting text below will assist in the initial classification of a waste. On completion of steps 1 and 2 you should be in a position to determine the most appropriate List of Waste (LoW) code(s) for the waste. You will then be able to determine whether the waste is automatically classified as hazardous or non-hazardous, or whether further assessment is required to make that decision.

Flowchart 2.1 Waste classification and assessment methodology: initial assessment



Steps 1 and 2: Waste, coding and classification

2.2.1 Step 1: Is the waste 'Directive waste' or required to be included as a potential hazardous waste based on domestic legislative provisions?

Directive wastes are wastes included in the scope of the Waste Framework Directive (WFD). In general, nearly all household, commercial and industrial waste is 'directive waste' and as such might be hazardous waste.

The WFD excludes certain wastes from its scope entirely and others where they are covered by separate legislation. The relevant text is presented on the following page. You should check domestic legislation to see how these wastes are regulated in each country, particularly with regards to radioactive waste and the exclusions of Article 2(2). Additional guidance for

England, Northern Ireland and Wales is provided by:

Guidance on the legal definition of waste and its application (August 2012)

Waste from a household is not excluded from the scope of the WFD. Mixed municipal waste produced by households, although directive waste, is not however subject to certain controls applicable to hazardous waste. This is described in the relevant domestic legislation.

Article 2 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.

2.2.2 Step 2: How is the waste classified on the List of Waste?

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

The chapters contain 842 waste entries, given a six-digit code, split into three types:

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

The instructions for use of the list and the identification of types of entry are set out in **Appendix A**.

If a waste is classified as an "absolute" hazardous entry, it is hazardous without any further assessment. You must however assess your waste to determine if it displays one or more hazardous properties; such information is required to complete a hazardous waste consignment note. Hazardous property assessment is covered in steps 3 to 6.

If a waste is classified as an absolute non-hazardous entry, it is non-hazardous without any further assessment. The waste should be managed in accordance with Duty of Care Regulations and other applicable legislation.

If the waste is a mirror entry you will need to continue with the assessment of hazardous properties to determine if the waste is classified as hazardous or not.

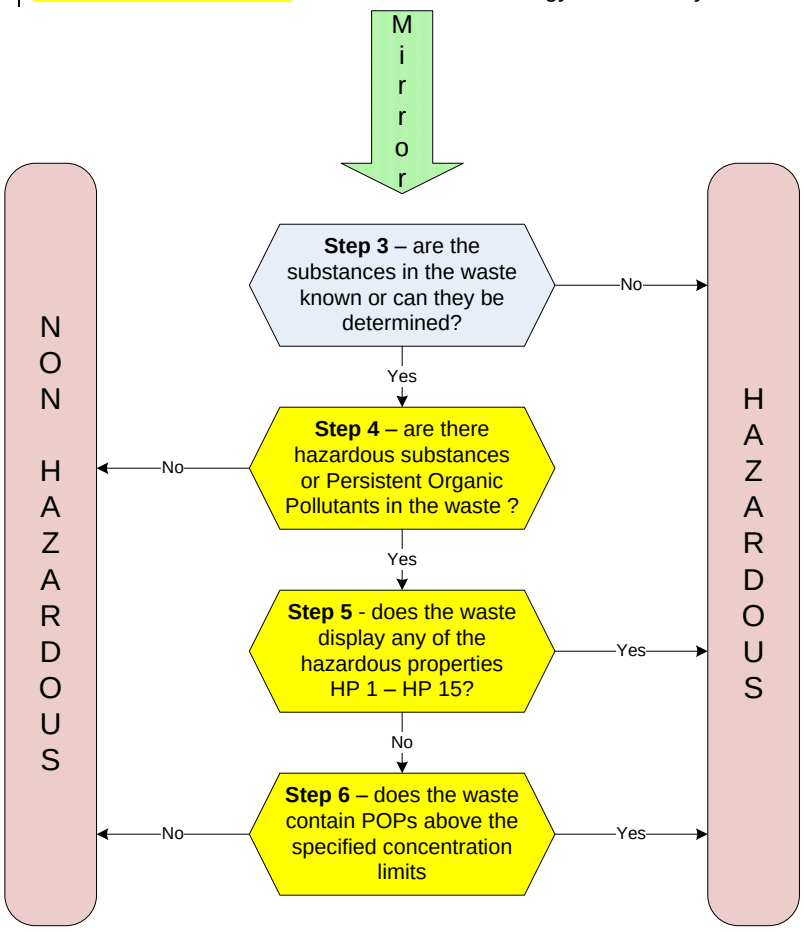
Note: the Secretary of State (SoS) or relevant devolved administration can decide that a specific batch of a waste that is listed as absolute hazardous or absolute non-hazardous is hazardous or non-hazardous depending on the presence or on the absence of hazardous properties. This is described in the relevant domestic legislation. Any waste determined by this process as hazardous or non-hazardous should be classified in accordance with that determination.

2.3 How to determine if a mirror entry is hazardous or non-hazardous

A mirror entry waste may be hazardous or non-hazardous. Flowchart 2.2 and the supporting text below will assist in:

- assessing whether such a waste displays one or more of the hazardous properties HP 1 to HP 15, or if any persistent organic pollutants are present, and
- assigning the appropriate LoW mirror entries.

Flowchart 2.2 Waste classification and assessment methodology: mirror entry assessment



Steps 3 to 6: Mirror entry assessment

Steps 3 to 6 consider:

- what the components of the waste are
- what the hazards of those components are
- whether those components cause the waste to display a hazardous property, and
- whether persistent organic pollutants make the waste hazardous

2.3.1 Step 3: are the substances in the waste known or can they be determined?

Waste holders have a duty to determine if a "mirror entry" waste is hazardous or non-hazardous. In order to determine whether a mirror entry waste is hazardous or not, you need to know its composition. There are three ways to determine the composition of a waste:

- manufacturer's information such as a product safety data sheet (SDS). If the composition has been altered during storage or use it will not be appropriate to rely fully on this information. It is important that you read **Appendix B** before using an SDS for waste assessment
- know fully the chemistry of a process such that the composition of the waste is well understood, or
- sample and analyse the waste to determine its composition. It is important that you read **Appendix D**, before undertaking any sampling, to ensure that any 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. Further information on this is provided in step 4.

Where the composition of the waste is not known a mirror entry waste must be classified as hazardous waste. However the consignment note requires that the composition of a hazardous waste is determined prior to the waste being removed from the premises of production. Direct testing methods for hazardous properties (for example flammability) are not available for all properties, and therefore cannot be used to classify a waste of unknown composition as non-hazardous.

2.3.2 Step 4: Are there "hazardous substances" or "Persistent Organic Pollutants" in the waste?

A "substance" is "hazardous" if it has a "hazard statement code".

You can find out if a substance has a hazard statement code, and identify the relevant hazard statement code(s), by reference to the Classification and Labelling Inventory;

http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database

Advice on how to use the inventory, and what to do if a substance is not listed in it, is provided in **Appendix B**.

The presence of any of the persistent organic pollutants (POPs) listed in Appendix C16 also needs to be established.

Table 2.1 illustrates the labels that you might see on chemical or waste containers. The CLP diamond pictograms are assigned to substances and mixtures within certain hazard classes. These hazard classes often relate to specific hazardous properties. So the presence of a

label can be an indicator that hazardous substances may be present. The absence of a pictogram does not indicate that such substances are absent.

If none of the substances in the waste have "hazard statement codes" , and no POPs are present, the waste is not hazardous and the non-hazardous mirror entry can be assigned to the waste. If any substances do have hazard statement codes, or POPs are present, you must go to Step 5.

Where the holder has some knowledge of the components but cannot decide which specific substances are present they must identify the *worst case compound(s)* for each of the components and assess the waste accordingly. The *worst case compound* should be determined for each hazardous property and is the substance, or combination of substances, that may reasonably exist within the waste that is most likely to result in that hazardous property applying.

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

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

2.3.3 Step 5: Does the waste display any of the hazardous properties HP 1 to HP 15?

If a waste identified by a "mirror entry" displays a hazardous property it will be hazardous.. The Hazardous Properties are listed in table 2.1.

There are two methods to determine if a mirror entry waste displays hazardous properties. These are:

- calculation - referring to a threshold limit for a hazard statement code (s), or
- testing to prove whether a particular hazardous property is present or not

At this point you should know what substances are present in the waste (or have assumed the *worst case scenario*) and what hazard statement codes they have. These hazard statement codes determine what hazardous properties have to be considered. Table 2.2 indicates which hazardous properties are associated with each hazard statement code and where appropriate a threshold limit. Instructions for the assessment of each hazardous property, based on these hazard statement codes, are given in **Appendix C**.

Note: Some entries in the LoW refer to specific hazardous substances; further advice on the assessment of these entries is given in Appendix A.

In most cases the outcome of the assessment is whether a waste is hazardous or not. If the waste displays any hazardous property the hazardous mirror entry must be assigned. If the waste displays no hazardous properties, you should go to Step 6 and consider POPs. Where mirror hazardous entries are linked to other mirror hazardous entries, or absolute hazardous entries, these linked entries must also be considered - see **Appendix A** for further information.

Table 2.1 Hazardous Properties, pictograms, and hazard classes

Pictogram	Hazard Classes	Related Hazardous Properties
	Unstable explosives Explosives, divisions 1.1, 1.2, 1.3, 1.4 Self-reactive substances and mixtures, types A, B Organic peroxides, types A, B	HP1 Explosive
	Oxidizing gases, category 1 Oxidizing liquids, categories 1, 2, 3 Oxidizing solids, categories 1, 2,	HP 2 Oxidising
	Flammable gases, category 1 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	HP 3 Flammable
	Skin corrosion, categories 1A, 1B, 1C Serious eye damage, category Corrosive to metals	• HP 4 Irritant / HP 8 Corrosive • HP 4 Irritant • No hazardous property
	Acute toxicity (oral, dermal, inhalation), category 4 Skin irritation, categories 2, 3 Eye irritation, category 2 Skin sensitization, category 1 Specific target organ toxicity following single exposure, category 3 • Respiratory tract irritation • Narcotic effects Hazardous to the ozone layer	• HP 6 Acute Toxicity • HP 4 Irritant • HP 4 Irritant • HP 13 Sensitising • HP 5 Specific Target Organ Toxicity/Aspiration Toxicity • HP 14 Ecotoxic

Pictogram	Hazard Classes	Related Hazardous Properties
	Acute toxicity (oral, dermal, inhalation), categories 1, 2, 3	HP 6 Acute Toxicity
	Respiratory sensitization, category 1 Germ cell mutagenicity, categories 1A, 1B, 2 Carcinogenicity, categories 1A, 1B, 2 Reproductive toxicity, categories 1A, 1B, 2 Specific target organ toxicity following single exposure, categories 1, 2 Specific target organ toxicity following repeated exposure, categories 1, 2 Aspiration hazard, categories 1, 2	• HP 13 Sensitising • HP 11 Mutagenic • HP 7 Carcinogenic • HP 10 Toxic for reproduction • HP 5 Specific Target Organ Toxicity/Aspiration Toxicity • HP 5 Specific Target Organ Toxicity/Aspiration Toxicity • HP 5 Specific Target Organ Toxicity/Aspiration Toxicity
	Hazardous to the aquatic environment – acute aquatic hazard, category 1 Hazardous to the aquatic environment – long-term aquatic hazard, category 1, 2	HP 14 Ecotoxic
No pictogram required	Explosives, divisions 1.5, 1.6 Flammable gases, category 2 Self-reactive substances and mixtures, type G Organic peroxides, type G Acute toxicity (oral, dermal, inhalation), category 5 Reproductive toxicity – effects on or via lactation Acute hazards to the aquatic environment, categories 2, 3 Chronic hazards to the aquatic environment, categories 3, 4	• HP 15 (capable of exhibiting another property) • HP 3 Flammable • No hazardous property • No hazardous property • No hazardous property • No hazardous property • HP 14 Ecotoxic • HP 14 Ecotoxic
	Compressed gases Liquefied gases Refrigerated liquefied gases Dissolved gases	No hazardous property
Not subject to chemical labelling requirements	n/a	HP9 Infectious

Table 2.2 Hazard statement codes and their associated hazardous properties

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
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		
H242	Heating may cause a fire.	Self-React.	C, D, E, F	See Appendix C3	HP 3
		Org. Perox.	C, D, E, F		

Hazard statement	Description	Hazard Class and Category In Table 3.1 of CLP		Threshold[2]	Hazardous Property
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	∑ (0.1%)	HP 6
		Acute Tox.	2	∑ (0.25%)	HP 6
H301	Toxic if swallowed.	Acute Tox.	3	∑ (5%)	HP 6
H302	Harmful if swallowed.	Acute Tox.	4	∑ (25%)	HP 6
H304	May be fatal if swallowed and enters airways.	Asp. Tox.	1	∑ (10%)	HP 5
H310	Fatal in contact with skin.	Acute Tox.	1	∑ (0.25%)	HP 6
		Acute Tox.	2	∑ (2.5%)	HP 6

Hazard statement	Description	Hazard Class and Category In Table 3.1 of CLP		Threshold[2]	Hazardous Property
H311	Toxic in contact with skin.	Acute Tox.	3	∑ (15%)	HP 6
H312	Harmful in contact with skin.	Acute Tox.	4	∑ (55%)	HP 6
H314	Causes severe skin burns and eye damage.	Skin Corr.	1A	∑ (1%)	HP 4
		Skin Corr.	1B, 1C	∑ (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	Indiv. 10%	HP 13
H318	Causes serious eye damage.	Eye Dam.	1	∑ (10%)	HP 4
H319	Causes serious eye irritation.	Eye Irrit.	2	See Appendix C4	HP 4
H330	Fatal if inhaled.	Acute Tox.	1	∑ (0.1%)	HP 6
		Acute Tox.	2	∑ (0.5%)	HP 6
H331	Toxic if inhaled.	Acute Tox.	3	∑ (3.5%)	HP 6
H332	Harmful if inhaled.	Acute Tox.	4	∑ (22.5%)	HP 6
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.	Resp. Sens.	1	Indiv. 10%	HP 13
H335	May cause respiratory irritation.	STOT SE	3	Indiv. 20%	HP5
H336	May cause drowsiness or dizziness.	STOT SE	3	n/a	n/a
H340	May cause genetic defects	Muta.	1A, 1B	Indiv. 0.1%	HP 11
H341	Suspected of causing genetic defects	Muta.	2	Indiv. 1%	HP 11
H350	May cause cancer	Carc.	1A, 1B	Indiv. 0.1%	HP 7
H351	Suspected of causing cancer	Carc.	2	Indiv. 1.0%	HP 7
H360[(1)]	May damage fertility or the unborn child	Repr.	1A, 1B	Indiv. 0.3%	HP 10

Hazard statement	Description	Hazard Class and Category In Table 3.1 of CLP		Threshold[2]	Hazardous Property
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
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

Hazard statement	Description	Hazard Class and Category In Table 3.1 of CLP		Threshold[2]	Hazardous Property
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	See H420
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

- Indiv. X%, where '*Indiv.*' means that the concentration of the individual hazardous substance is compared to the threshold
- ∑ (X%), where '∑' means that the concentration of all hazardous substances with that hazard statement 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 supplemental/additional hazard statements listed in the Labelling section of Table 3.1 of the CLP.

2.3.6 Step 6 - does the waste contain POPs above the specified concentration limits?

If a waste identified by a “mirror entry” contains persistent organic pollutants (POPs) above the specified concentration limits it will be hazardous.

The list of POPs that must be considered, and the concentration limit that applies to each, are set out in Appendix C16.

2.4 Notes on using Table 2.2

Waste holders should be aware of the following issues when using Table 2.2.

2.4.1 Concentration effects

The hazard class, category and statement codes assigned to a substance 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 in a harmonised entry in the Classification and Labelling Inventory as Flam. Liq. 2: H225, which indicates that at 100% concentration it will have a flashpoint less than 23^{o}C . However, an aqueous (“mirror entry") waste containing 4% w/w ethanol, will have a flashpoint greater than 60^{o}C, and so will not be hazardous. At higher concentrations of ethanol, the flashpoint will reduce to below 60^{o}C so the waste will be hazardous by HP 3 “Flammable”. Where liquid wastes are concerned a flashpoint determination is probably appropriate to identify whether the waste is flammable or highly flammable.

2.4.2 Additional/Supplemental Hazard Statement Codes

Hazard Statement Codes starting with EUH are known as “additional hazards”. 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. Wastes containing substances with the hazard statement code

- EUH001, EUH019 or EUH044 need to be assessed for HP 15, see Appendix C15 for further details.
- EUH029, EUH031 or EUH032 need to be assessed for HP 12, see Appendix C12 for further details

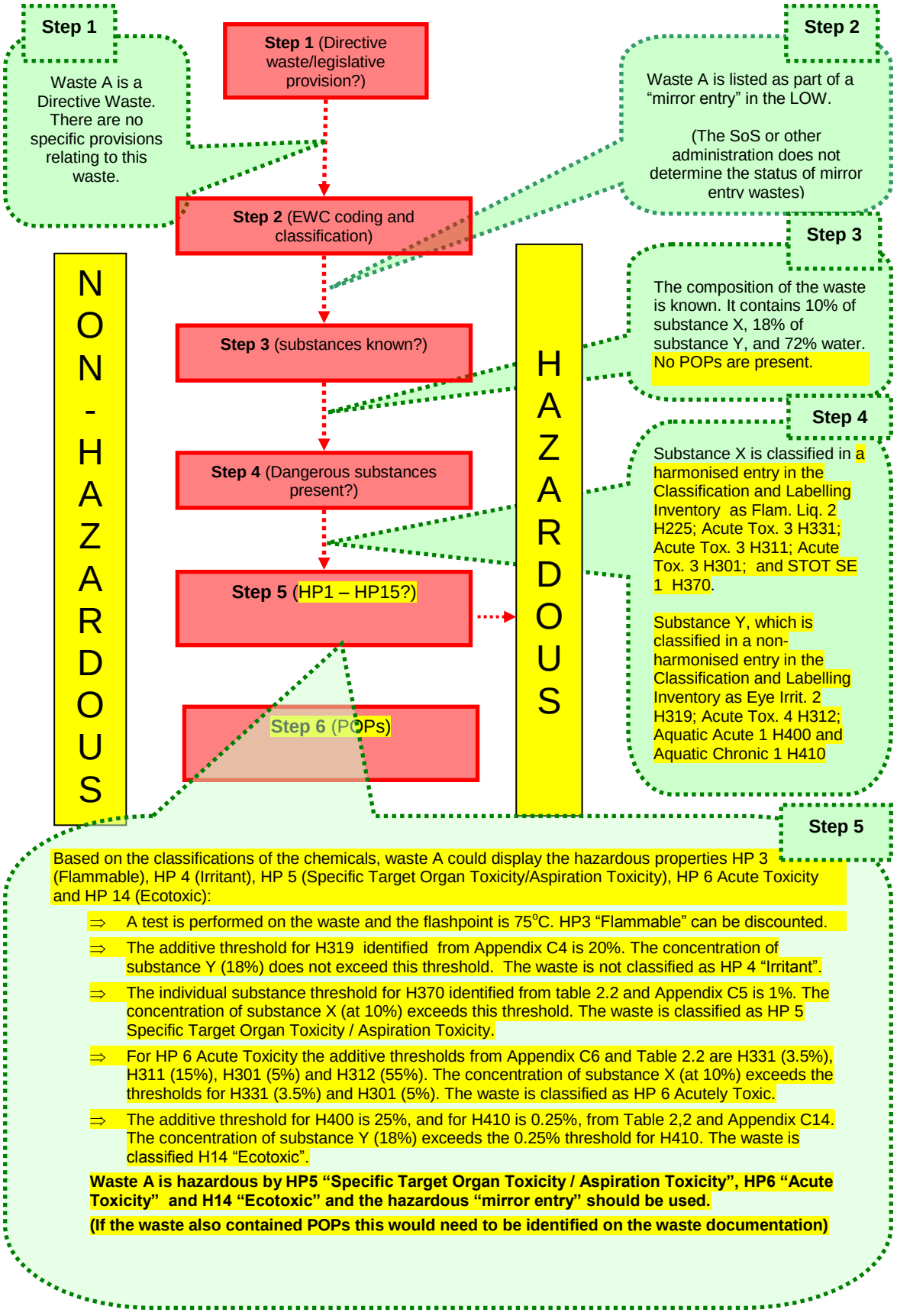
Wastes containing substances with any of the other additional hazard statement codes, whether hazardous or not, need to be identified as having additional handling risks.

Note: EUH059, hazardous to the ozone layer, has been replaced by H420.

2.5 Summarising the assessment of waste

In Figure 2.2 an example assessment is given for waste A, produced from a manufacturing process. Waste A contains 10% of substance X and 18% of substance Y with the remainder being water.

Figure 2.2 | Theoretical example of hazardous waste assessment methodology



Appendix A:

Consolidated List of Waste

The aim of this Appendix is to reproduce in full the List of Waste, including the legal instructions on its use, and give additional guidance on certain aspects of its use. The outcome of choosing the most appropriate entry in the list will help you decide whether you have a waste that is automatically hazardous, a waste that is automatically non-hazardous or a waste that you will have to do a full assessment on – a so-called 'mirror entry' waste.

A1.1 The structure of the List of Waste (LoW)

The LoW was established by Commission Decision 2000/532/EC[1]. It consists of 20 chapters that must be used in a certain order of precedence. Some chapters relate to processes that generate waste and some refer to specific waste types.

The chapter headings are given a two-digit number as shown in Table A1.1 below. An example of a chapter is:

20 MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS.

Each chapter of the LoW contains sub-chapters that are identified by four-digits, for example:

20 01 Separately collected fractions (except 15 01)

Within each sub-chapter is a list of waste types each given a unique six digit code, for example:

20 01 01 paper and cardboard AN[2]

For a waste to be given a particular LoW code, reference must be made to the 2, 4 and 6 digit entries. In the case of 20 01 01 the waste must:

- be paper or cardboard or a mixture of paper and cardboard
- be kept separately from other wastes when collected
- from a household (or is waste similar to that produced by a household), and
- not be packaging waste (which would be coded in sub-chapter 15 01 even if from a household)

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

[1] Commission Decision 2000/532/EC as amended by 2001/118/EC, 2001/119/EC and 2001/573/EC. A consolidated version can be found at http://eur-lex.europa.eu/LexUriServ/site/en/consleg/2000/D/02000D0532-20020101-en.pdf

[2] For a description of what AN, AH, MH and MN means see Section A1.2.

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

Code	Chapter Description	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

A1.2 Choosing a code from the LoW – the order of precedence of chapter use

There are 839 waste entries in the LoW and choosing a code for a waste can be complicated. It is important to understand that the LoW is not a 'look up' list. You must;

- consider the entire list, rather than focussing on a single process chapter, and
- use the chapters in the order of preference specified in Commission Decision 2000/532/EC (set out in steps 1 to 5 below)

to enable you to identify the "appropriate" code for your waste.

Step 1 Identification by waste source

Chapters 01 to 12 and 17 to 20 refer specifically to industry process waste and municipal waste. 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

The decision as to which of these entries you would choose is discussed below in Step 5.

You must not use a six digit 99 entry at Step 1 because more appropriate entries might be found in other chapters.

Step 2 Identification by waste type

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. These chapters contain oil wastes; solvent wastes; and waste packaging, absorbents, filter materials, wiping cloths and protective clothing.

Step 3 Other general wastes

If waste is not found in chapters 01 to 15 or 17 to 20, then chapter 16 might contain the most appropriate code.

Chapter 16 contains a lot of general wastes such as vehicles, electronic equipment and batteries, as well as a number of chemical wastes like catalysts, laboratory chemicals and oxidisers.

Step 4 Non-specific wastes

Sometimes wastes cannot be found specifically in the LoW. 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).

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

Step 5 Hazardous waste classification

Some of the six-digit codes in the LoW have an asterisk (*) next to them; these are hazardous wastes. Wastes without an asterisk are non-hazardous waste.

In the LoW there are three types of entry:

- entries coloured in red and labelled AH; they are known as "absolute" hazardous wastes
- entries coloured in black and labelled AN; they are known as absolute non-hazardous wastes
- entries known as "mirror" entries

Absolute hazardous (AH) entries

These wastes are marked in the List with an asterisk (*) but the waste description next to the six-digit code does not have a "specific" or "general" reference to "*hazardous substances*" in their waste description. They are automatically considered hazardous. You do not need to work out what chemicals are in the waste to find out if it is hazardous or not. You must still find what (if any) hazardous properties the waste displays for consignment and transport purposes.

We call these "*absolute entries*", and they are colour-coded red in WM2 Appendix A. For example:

13 07 01* fuel oil and diesel AH

Key Point : Absolute Hazardous Wastes with No Hazardous Properties

A waste that falls under an absolute hazardous entry (e.g. 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 list 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

Mirror entries

Mirror entries are typically divided into two:

- entries coloured in blue and labelled MH; they are known as "mirror" hazardous wastes
- entries coloured in green and labelled MN; they are known as "mirror" non-hazardous wastes

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 paired 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 if this waste contains any hazardous substance(s) at or above levels that make it 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 contains the particular hazardous substance (in this case coal tar) at or above levels that make it hazardous.

Guidance on whether the hazardous or non-hazardous mirror entry is applicable is given in Chapter 2 and Appendix C.

Key Point : Atypical 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)**, or multiple **mirror non-hazardous (MN)**.

These entries may occur as groups of several entries, and a **mirror non-hazardous (MN)** entry may not always be provided.

We have provided some examples in this chapter to explain how such unconventional entries are applied.

A1.3 Examples of how coding should be applied

The following are provided in this section:

Examples with general application to the list (**not** marked against specific entries)

1. Co-collected and mixed wastes
2. Alloys
3. Waste oils and oil contaminated wastes

Examples applicable to specific entries or wastes (marked against specific entries)

4. Drilling muds
5. Sulphuric acid from a power station
6. Drosses and skimmings
7. Crematoria waste
8. Sludges and solids from tempering processes
9. Polychlorinated biphenyls (PCBs)
10. Packaging wastes and contents
11. Absorbents and protective clothing
12. End of life vehicles
13. Unbound carbon nanotubes (waste containing)
14. Aqueous liquids or concentrates
15. Soil, stones and dredging spoil
16. Coal tar
17. Soil and other construction and demolition waste containing or contaminated with asbestos
18. Medicines from manufacturing, healthcare, and municipal fractions.
19. Offensive hygiene waste from non-healthcare activities
20. Batteries from municipal sources
21. Waste electronic and electrical equipment

A1.4 The List of Waste

The LoW is reproduced below.

Key:

The type of entry is identified as one of:

- **AH : Absolute hazardous** entry - automatically hazardous waste, threshold assessment not required
- **(MH): Mirror hazardous** entry - threshold assessment required – other entry or entries, usually but not exclusively, non-hazardous entries
- **MN : Mirror non-hazardous** entry- non-hazardous entry usually linked to a mirror hazardous waste
- **AN : Absolute non-hazardous** entry non-hazardous entry usually linked to a mirror hazardous waste

A number in the 'example provided' column identifies that an example specific to that entry is provided in this chapter. General examples apply to all entries and are not identified by entry.

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	4
01 05 05*	oil-containing drilling muds and wastes	AH	4
01 05 06*	drilling muds and other drilling wastes containing hazardous substances	MH	4
01 05 07	barite-containing drilling muds and wastes other than those mentioned in 01 05 05 and 01 05 06	MN	4
01 05 08	chloride-containing drilling muds and wastes other than those mentioned in 01 05 05 and 01 05 06	MN	4
01 05 99	wastes not otherwise specified	MN	4
02	**WASTES FROM AGRICULTURE, HORTICULTURE,**		

Code	Description	Entry Type	Example provided
	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	
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**		

Code	Description	Entry Type	Example provided
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	
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	

Code	Description	Entry Type	Example provided
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	
04 01 05	tanning liquor free of chromium	AN	
04 01 06	sludges, in particular from on-site effluent treatment containing chromium	AN	
04 01 07	sludges, in particular from on-site effluent treatment free of chromium	AN	
04 01 08	waste tanned leather (blue sheetings, shavings, cuttings, buffing dust) containing chromium	AN	
04 01 09	wastes from dressing and finishing	AN	
04 01 99	wastes not otherwise specified	MN	
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	
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	

Code	Description	Entry Type	Example provided
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	
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	

Code	Description	Entry Type	Example provided
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	
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**		

Code	Description	Entry Type	Example provided
	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	
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	
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	
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	

Code	Description	Entry Type	Example provided
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	
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	
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	
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	
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	

Code	Description	Entry Type	Example provided
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	18
07 05 14	solid wastes other than those mentioned in 07 05 13	MN	18
07 05 99	wastes not otherwise specified	AN	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	
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	
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	
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	MH	

Code	Description	Entry Type	Example provided
	hazardous substances		
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	
08 02 03	aqueous suspensions containing ceramic materials	AN	
08 02 99	wastes not otherwise specified	AN	
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	

Code	Description	Entry Type	Example provided
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	
09 01 07	photographic film and paper containing silver or silver compounds	AN	
09 01 08	photographic film and paper free of silver or silver compounds	AN	
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	
09 01 12	single-use cameras containing batteries other than those mentioned in 09 01 11	MN	
09 01 13*	aqueous liquid waste from on-site reclamation of silver other than those mentioned in 09 01 06	AH	
09 01 99	wastes not otherwise specified	MN	
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	

Code	Description	Entry Type	Example provided
10 01 07	calcium-based reaction wastes from flue-gas desulphurisation in sludge form	AN	
10 01 09*	sulphuric acid	AH	5
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	7
10 01 19	wastes from gas cleaning other than those mentioned in 10 01 05, 10 01 07 and 10 01 18	MN	7
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	
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	

Code	Description	Entry Type	Example provided
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	AH	6
10 03 16	skimmings other than those mentioned in 10 03 15	AN	6
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	
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	
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	

Code	Description	Entry Type	Example provided
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	AH	
10 05 11	dross and skimmings other than those mentioned in 10 05 10	AN	
10 05 99	wastes not otherwise specified	AN	
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	
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	AH	6
10 08 11	dross and skimmings other than those mentioned in 10 08 10	AN	6
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	

Code	Description	Entry Type	Example provided
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	
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	
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	

Code	Description	Entry Type	Example provided
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	
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**		

Code	Description	Entry Type	Example provided
	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	
10 13 99	wastes not otherwise specified	AN	
10 14	**waste from crematoria**		
10 14 01*	waste from gas cleaning containing mercury	MH	7
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**		

Code	Description	Entry Type	Example provided
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	MH	8
11 03 02*	other wastes	AH	8
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	
12 01 07*	mineral-based machining oils free of halogens (except emulsions and solutions)	AH	
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	

Code	Description	Entry Type	Example provided
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	
12 03	**wastes from water and steam degreasing processes (except 11)**		
12 03 01*	aqueous washing liquids	AH	
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	MH	9
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	
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	MH	9
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	
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	

Code	Description	Entry Type	Example provided
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	
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	10
15 01 02	plastic packaging	AN	10
15 01 03	wooden packaging	AN	10
15 01 04	metallic packaging	AN	10
15 01 05	composite packaging	AN	10
15 01 06	mixed packaging	AN	10
15 01 07	glass packaging	AN	10
15 01 09	textile packaging	AN	10
15 01 10*	packaging containing residues of or contaminated by hazardous substances	AH	10
15 01 11*	metallic packaging containing a hazardous solid porous matrix (for example asbestos), including empty pressure containers	AH	10
15 02	**absorbents, filter materials, wiping cloths and protective clothing**		

Code	Description	Entry Type	Example provided
15 02 02*	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by hazardous substances	MH	11
15 02 03	absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02	MN	11
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	12
16 01 06	end-of-life vehicles, containing neither liquids nor other hazardous components	AN	12
16 01 07*	oil filters	AH	
16 01 08*	components containing mercury	MH	
16 01 09*	components containing PCBs	MH	9
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	
16 02	**wastes from electrical and electronic equipment**		
16 02 09*	transformers and capacitors containing PCBs	AH	9,21
16 02 10*	discarded equipment containing or contaminated by PCBs other than those mentioned in 16 02 09	AH	9,21
16 02 11*	discarded equipment containing chlorofluorocarbons, HCFC, HFC	AH	21
16 02 12*	discarded equipment containing free asbestos	AH	21
16 02 13*	discarded equipment containing hazardous components other than those mentioned in 16 02 09 to 16 02 12 [Note 1]	AH	21
16 02 14	discarded equipment other than those mentioned in 16 02 09 to 16 02 13	AN	21
16 02 15*	hazardous components removed from discarded equipment	AH	21
16 02 16	components removed from discarded equipment other than those	AN	21

Code	Description	Entry Type	Example provided
	mentioned in 16 02 15		
16 03	**off-specification batches and unused products**		
16 03 03*	inorganic wastes containing hazardous substances	MH	13
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	14
16 10 02	aqueous liquid wastes other than those mentioned in 16 10 01	MN	14
16 10 03*	aqueous concentrates containing hazardous substances	MH	14
16 10 04	aqueous concentrates other than those mentioned in 16 10 03	MN	14
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	
17 02 04*	glass, plastic and wood containing or contaminated with hazardous substances	MH	

Code	Description	Entry Type	Example provided
17 03	**bituminous mixtures, coal tar and tarred products**		
17 03 01*	bituminous mixtures containing coal tar	MH	16
17 03 02	bituminous mixtures other than those mentioned in 17 03 01	MN	16
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	
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	
17 05	**soil (including excavated soil from contaminated sites), stones and dredging spoil**		
17 05 03*	soil and stones containing hazardous substances	MH	15, 17
17 05 04	soil and stones other than those mentioned in 17 05 03	MN	15, 17
17 05 05*	dredging spoil containing hazardous substances	MH	15, 17
17 05 06	dredging spoil other than those mentioned in 17 05 05	MN	15, 17
17 05 07*	track ballast containing hazardous substances	MH	15, 17
17 05 08	track ballast other than those mentioned in 17 05 07	MN	15, 17
17 06	**insulation materials and asbestos-containing construction materials**		
17 06 01*	insulation materials containing asbestos	MH	17
17 06 03*	other insulation materials consisting of or containing hazardous substances	MH	17
17 06 04	insulation materials other than those mentioned in 17 06 01 and 17 06 03	MN	17
17 06 05*	construction materials containing asbestos	MH	17
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**		

Code	Description	Entry Type	Example provided
17 09 01*	construction and demolition wastes containing mercury	MH	
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	9
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	
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	
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 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	18
18 01 09	medicines other than those mentioned in 18 01 08	AN	18
18 01 10*	amalgam waste from dental care	AH	
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	
18 02 03	wastes whose collection and disposal is not subject to special requirements in order to prevent infection	AN	
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	18
18 02 08	medicines other than those mentioned in 18 02 07	AN	18
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**		

Code	Description	Entry Type	Example provided
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	
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	
19 02 99	wastes not otherwise specified	MN	
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	
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	

Code	Description	Entry Type	Example provided
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	
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	
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	

Code	Description	Entry Type	Example provided
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	
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	MH	

Code	Description	Entry Type	Example provided
	substances		
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	10
20 01 02	glass	AN	10
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	21
20 01 23*	discarded equipment containing chlorofluorocarbons	AH	21
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	18
20 01 32	medicines other than those mentioned in 20 01 31	AN	18
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
20 01 34	batteries and accumulators other than those mentioned in 20 01 33	AN	20
20 01 35*	discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components [Note 2]	AH	21
20 01 36	discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35	AN	21
20 01 37*	wood containing hazardous substances	MH	
20 01 38	wood other than that mentioned in 20 01 37	MN	

Code	Description	Entry Type	Example provided
20 01 39	plastics	AN	10
20 01 40	metals	AN	
20 01 41	wastes from chimney sweeping	AN	
20 01 99	other fractions not otherwise specified	AN	19
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	
20 03 06	waste from sewage cleaning	AN	
20 03 07	bulky waste	AN	
20 03 99	municipal wastes not otherwise specified	AN	

Definitions and Notes from the LoW from Council Decision 2000/532/EC

Note 1 & Note 2	Hazardous components from electrical and electronic equipment may include accumulators and batteries mentioned in 16 06 and marked as hazardous; mercury switches, glass from cathode ray tubes and other activated glass, and other similar items.

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
'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.

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).**

England and Wales

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. Wastes that have been mixed must be separated whenever possible.

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 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:

(i) non-cytotoxic and cytostatic medicinally contaminated sharps from human healthcare (18 01 03* and 18 01 09)

(ii) 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.

Northern Ireland

EU legislation recognises that individual waste streams should in principle be kept separate from other wastes and not mixed. The Waste Framework Directive specifically prohibits the mixing of hazardous waste with other wastes unless it is carried out by an establishment or undertaking which has a relevant authorisation and satisfies certain conditions. However 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 the wastes present. If more than one separately identifiable waste is present then more than one list of waste code will be required.

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 fact that a hazardous waste is present in the load deems the whole load to be hazardous and therefore it must be taken to a waste management facility suitably authorised to accept hazardous waste unless the battery is segregated from the wood waste.

The same multiple coding approach is applied to the coding and classification of healthcare waste. For example, a sharps container, from human healthcare, consisting of infectious sharps (18 01 03*) and cytostatic contaminated sharps (18 01 08*) would list both codes on the consignment note.

Scotland

Waste producers in Scotland should be aware that SEPA have a different position, to that highlighted above, to reflect legislation in Scotland.

The mixing of a Hazardous Waste (special waste) with other wastes, hazardous or non-hazardous, should be avoided, unless carried out at a suitably licensed facility, and where already mixed with other waste, substances or materials, the waste should be separated where technically and economically feasible. However 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.

Hazardous waste mixed with hazardous waste:

The chosen code should reflect the processes that produced the waste and ensure that the most appropriate disposal route is followed.

For example, a sharps container, from human healthcare, consisting of infectious sharps (18 01 03*) and cytotoxic/cytostatic contaminated sharps (18 01 08*) would list both codes on the consignment note however as incineration is the legal minimum treatment standard for cytotoxic/cytostatic wastes the need for incineration should be highlighted in the written description to comply with Duty of Care..

Please note that only hazardous codes should be included on a Special Waste Consignment Note or used in the written description for a Hazardous Waste.

Hazardous waste mixed with non-hazardous Waste:

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.

Non-hazardous waste mixed with a non-hazardous waste:

The chosen EWC should reflect the processes that produced the waste and ensure that the most appropriate treatment or disposal route is followed for each waste stream.

As part of their Duty of Care Producers are expected to provide a full description of their waste and where mixed wastes are concerned producers should use their written description of the waste to describe the waste fully rather than relying solely on EWC codes.

Example 2	**Alloys**
Scope	**Generally applicable** **Applies to the assessment of any waste containing pure metal alloys in their massive form**
Only alloys in their massive form that specifically listed as hazardous, or contaminated by hazardous substances, should be treated as hazardous. The only 'alloy' specifically listed in the LoW is: 18 01 10* amalgam waste from dental care AH This approach is set out in Commission Decision 2000/532/EC.	

Example 3	Waste oils and oil contaminated waste
Scope	**Generally applicable** **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.**

3.1: Introduction

The term 'Oil' covers many substances or mixtures including the broad use of mineral based fuels and lubricants, food or animal feeds and miscellanea 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.

3.2 : 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.

The information in this section is provided to assist in the determining whether wastes contaminated with oil display hazardous properties as a result of the presence of oil. It does not apply to wastes considered in the previous section on waste oil.

This section considers only waste oils as a potential contaminant in a waste. Where the waste contains additional 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 A3 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.

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 (see section 3.4 of this example). All properties of the oil must be considered; where the Classification and Labelling Inventory is used to determine hazard statement codes you will need to look at other data sources to determine if your waste might also exhibit Ecotoxic, Flammable, Mutagenic and Toxic for Reproduction properties as the hazard statement codes for these properties 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 A3: Example Classifications of Some Petroleum Groups

Petroleum Group							
Petrol (Gasoline)		**Diesel**		**Heavy/Residual Fuel Oils**		**Crude Oils**	
Flam. Liq 1	H224	Flam. Liq. 3	H226	Muta. 1B	H340	Flam. Liq, 2	H225
Skin Irrit.2	H315	Skin Irrit. 2	H315	Carc. 1B	H350	Carc. 1B	H350
Muta. 1B	H340	Acute Tox. 4	H332	Acute Tox. 4	H332	Eye Irrit. 2	H319
Carc. 1B	H350	Carc. 2	H351	Repr. 2	H361d	Asp.Tox. 1	H304
Repr. 2	H361d	Asp.Tox. 1	H304	STOT RE 2	H373	STOT RE2	H373
STOT SE3	H336	STOT RE 2	H373	Aquatic Chronic 2	H411	STOT SE3	H336
Asp. Tox.1	H304	Aquatic Chronic 2	H411			Aquatic Chronic 2	H411
Aquatic Chronic 2	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 16. 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:

- (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 (HP 14 Ecotoxic)

The assessment of the waste is based on the presence of oil considers each of these in turn using the Total Petroleum Hydrocarbons (TPH) (C_6 to C_{40}) concentration. The bullets below compare the concentration of TPH to the threshold 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 ≥ XXX% 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 (see section 3.4. for further information).

* 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.

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

The assessment of HP 7 Carcinogenic and HP 11 Mutagenic is undertaken in accordance with 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 three circumstances;

- Wastes contaminated with known oil (other than 3.4.2).
- Wastes contaminated with unknown oil and wastes from treatment of oil contaminated waste.

3.4.1: Wastes contaminated with known oil (other than 3.4.2)

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.

3.4.2: 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

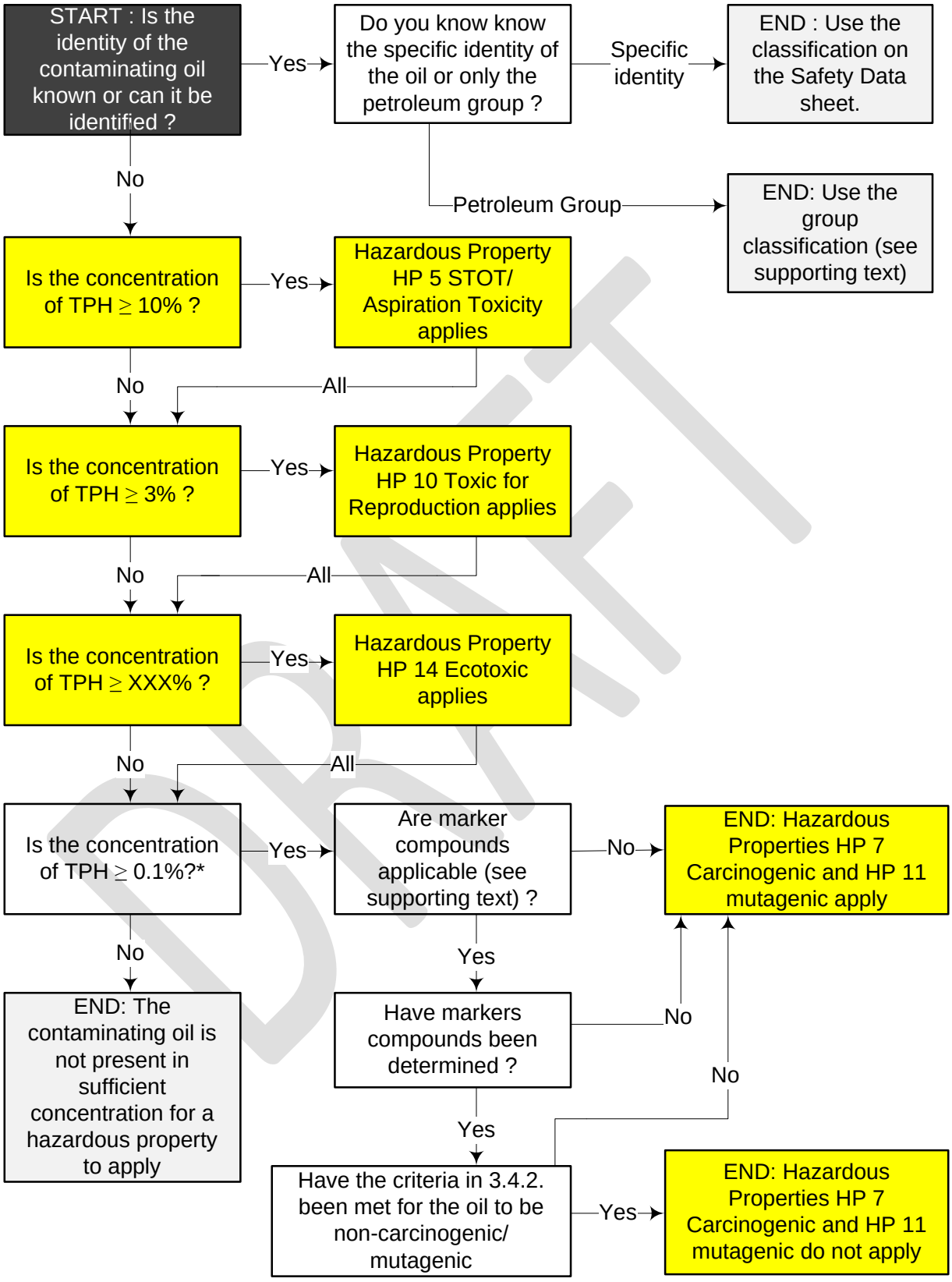
If the identity of the oil is unknown, and the petroleum group cannot be established, then the oil contaminating the waste can be classified as non-carcinogenic/mutagenic due to the presence of oil if all three of the following criteria are met:

- 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 3.1 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 threshold 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: The assessment of wastes, other than waste oils, containing or contaminated with oil



Example 4	Drilling muds
Scope	**This example provides advice on the use of entries for drilling muds in sub-chapter 01 05 of the List of Wastes** **It does not apply to wastes other than drilling muds.**

There are six entries for drilling muds sub-chapter 01 05 of the List of wastes.

01 05 04 freshwater drilling muds and wastes	AN
01 05 05* oil-containing drilling muds and wastes	AH
01 05 06* drilling muds and other drilling wastes containing hazardous substances	MH
01 05 07 barite-containing drilling muds and wastes other than those mentioned in 01 05 05 and 01 05 06	MN
01 05 08 chloride-containing drilling muds and wastes other than those mentioned in 01 05 05 and 01 05 06	MN
01 05 99 wastes not otherwise specified	MN

These entries are assigned:

(i) primarily by the type of drilling mud, and

(ii) then by the hazardous substances present

01 05 04 is an absolute non-hazardous entry used when the drilling fluid used is freshwater based.

There are two entries that are hazardous:

(i) 01 05 05* is an absolute hazardous entry that is used when the drilling fluid used is oil-based

(ii) 01 05 06* is a mirror entry hazardous code used when the drilling fluid is barite-based or chloride-based but contains hazardous substances (including oil contamination) above the relevant threshold

01 05 06* is an example of a mirror hazardous entry that has more than one non-hazardous mirror, that is 01 05 07 and 01 05 08.

Due to the structure of this group of entries, the 99 code is not expected to be appropriate for the classification of drilling mud.

Example 5	Sulphuric acid from a power station
Scope	**This example provides advice on the classification of waste sulphuric acid produced by a power station.** **It does not apply to other wastes, or to sulphuric acid from other sources.**

There is a specific entry for this waste in chapter 10 (wastes from thermal processes) under sub chapter 10 01 (waste from power stations and other combustion plants):

10 01 09* sulphuric acid	AH

It is important to recognise that although there is a specific entry for sulphuric acid in chapter 06, 06 01 01* sulphuric acid and sulphurous acid (AH), this entry should not be used because the chapter 10 entry best describes the process that produced the waste.

Example 6	Drosses and skimmings
Scope	**This example provides guidance on the classification of** **(i) skimmings from Aluminium thermal metallurgy; and** **(ii) and skimming and drosses from 'other non-ferrous thermal metallurgy'.** **It does not apply to drosses and skimmings from other sources.**

The list of waste provides the following codes for skimmings from aluminium thermal metallurgy

10 03 15* skimming that are flammable or emit, upon contact with water, flammable gases in hazardous quantities AH

10 03 16 skimmings other than those mentioned in 10 03 15 AN

The list of waste provides the following codes for skimmings and drosses from other non-ferrous thermal metallurgy

10 08 10* dross and skimmings that are flammable or emit, upon contact with water, flammable gases in hazardous quantities AH

10 08 11 dross and skimmings other than those mentioned in 10 03 15 AN

These pairs of entries are linked entries but they are not mirrors of one another.

For 10 03 15* or 10 08 10* to be applicable to such skimmings and drosses they have to be flammable or produce flammable gases on contact with water. If this is not the case these wastes are coded 10 03 16 or 10 08 11 as applicable and so are not hazardous.

Example 7	Crematoria gas cleaning waste
Scope	**This example provides guidance on the classification of wastes from gas cleaning produced by Crematoria.** **It does not apply to gas cleaning wastes from other sources.**

There is only one code for this waste in chapter 10 of the LoW:

10 14 01* waste from gas cleaning containing mercury MH

An assessment of the waste must be carried out based on the quantities of mercury present to decide the appropriate code. If the mercury content (mercury metal or its compounds) does not make the waste hazardous, it is not immediately clear what the alternative code is. Looking for an alternative in the LoW however, the most appropriate codes are:

10 01 18* waste from gas cleaning containing hazardous substances MH

10 01 19 waste from gas cleaning other than those mentioned in 10 01 05, 10 01 07 and 10 01 18 MN

This means that an assessment for all hazardous substances (other than mercury) must be made to determine the correct mirror code and therefore if the waste is either hazardous or non-hazardous.

Example 8	Sludges and solids from tempering processes
Scope	**This example provides guidance on the classification of sludges and solids produced by tempering processes.** **It does not apply to sludges or solids produced by other activities/processes.**

Chapter 11 contains the following codes applicable to sludges and solids from tempering processes:

11 03 01* wastes containing cyanide MH

11 03 02* other wastes AH

Wastes from tempering processes will always be hazardous. They will either be classified as:

(i) containing cyanide and therefore be 11 03 01*; or

(ii) if they do not contain cyanide, they will be classified as 11 03 02* other wastes which is an absolute hazardous code

To be assigned 11 03 01* wastes containing cyanide, the waste must contain enough cyanide to possess a hazardous property, for example HP 6, HP 12, HP 14.

Example 9	Polychlorinated biphenyls and terphenyls (PCB's)
Scope	**This example provides guidance on the use of the list of waste codes in Chapters 13, 16 and 17, that refer specifically to Polychlorinated biphenyls (PCBs)** **For other entries in the list of waste (that make no specific reference to PCB's) see Appendix C16 on Persistent Organic Pollutants.**

The list of waste links these entries to the PCB Directive[3].

A waste code including the term "containing PCBs" is used when PCB is present in the waste (or where applicable a component of the waste) at a concentration of at least 50 ppm (0.0050%). For example:

Most of the entries in Chapter 13 are absolute hazardous. There are two exceptions:

13 01 01* hydraulic oils, containing PCBs MH

13 03 01* insulating or heat transmission oils, containing PCBs MH

Hydraulic, insulating and heat transmission oils can in some cases contain PCBs.

A waste code including the term "containing PCBs" is used when PCB is present in the oil at a concentration of equal to or greater than 50 ppm (0.0050%).

The waste is a mirror entry because the assessment is based on this concentration limit.

If the waste is not classified as "containing PCBs" because the concentration is below the limit, other entries are then applicable. For example, a mineral-based chlorinated hydraulic oil containing no PCB or PCB below 50 ppm would be coded 13 01 09* mineral-based chlorinated hydraulic oil (AH), which is an absolute hazardous waste.

The same general principles apply to PCB entries in chapter 16 and 17, however examples relating to those chapters may also apply.

The disposal of PCB containing wastes is controlled by the PCB Directive[4] and the Persistent Organic Pollutants Regulation[5].

[3] Directive 96/59/EC, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31996L0059:EN:HTML

[4] Directive 96/59/EC, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31996L0059:EN:HTML

[5] 259/2004/EC (as amended), http://ec.europa.eu/environment/pops/index_en.htm

Example 10	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)'*

10.1: Introduction

Chapter 15 of the List 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 A10

10.2 : Packaging waste or 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 "emptyll 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

10.3: Packaging waste

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 possesses a hazardous property. Empty packaging containing residues of, or contaminated by, hazardous substances that possess 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.

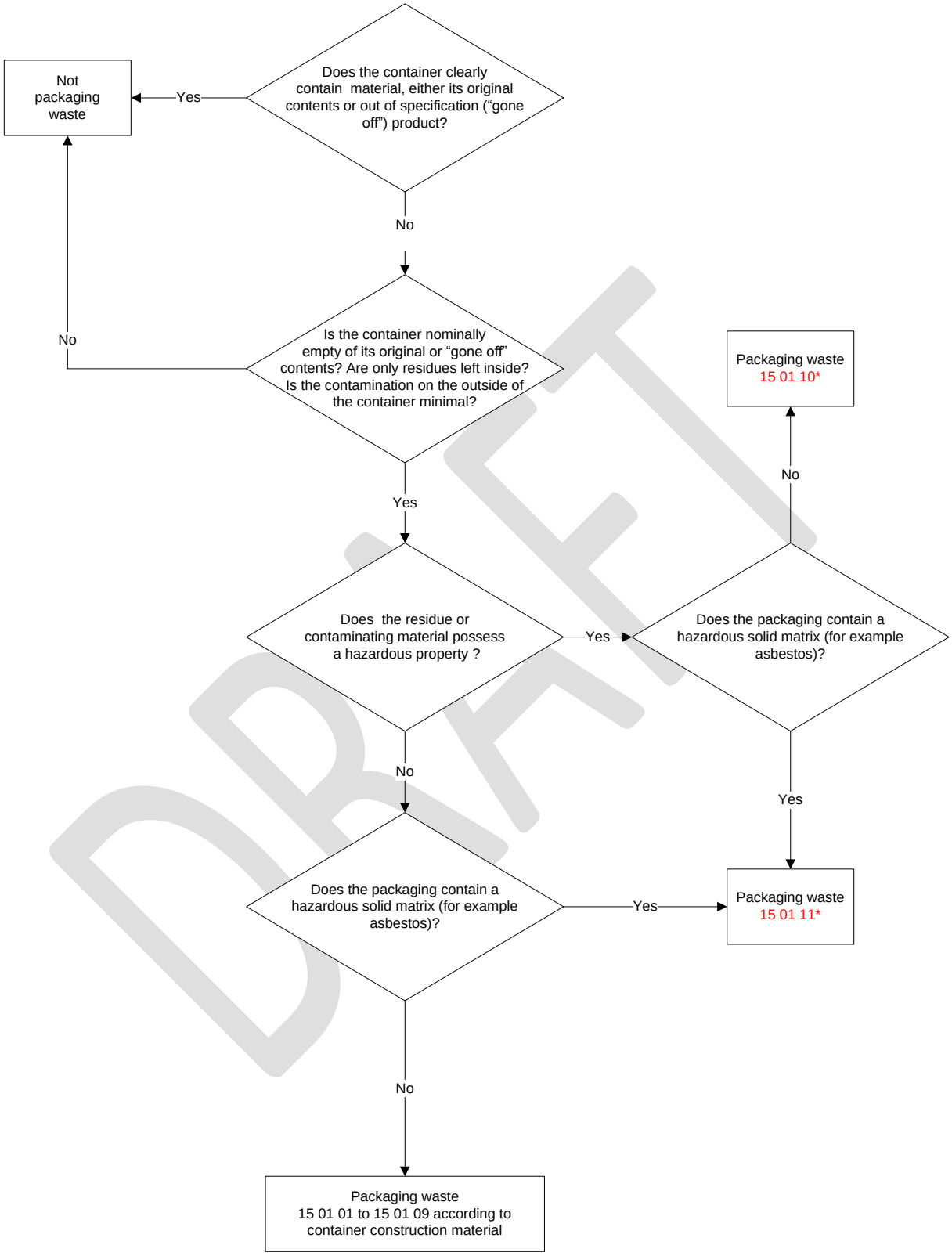
The appropriate non-hazardous packaging code is applied to empty packaging if:

- 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

Figure A10 | The application of waste packaging codes



Example 11	Absorbents, filter material, and protective clothing
Scope	**This example provides guidance on the use of sub-chapter 15 02 for absorbants, filter material and protective clothing**

Used absorbents or protective clothing can be coded as follows:

15 02 02* absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by hazardous substances MH

15 02 03 absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02 MN

When assessing these types of wastes the term “contaminated” has the same meaning as containing. This codes should be treated the same as any other mirror entries. This means that if hazardous substances are present at or above the threshold values the waste will be hazardous and assigned the 15 02 02* code. The weight of the absorbent or other material can be taken into account when assessing the material and its contents against threshold limits.

Example 12	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[6] 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[7].

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

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

Example 13	Unbound carbon nanotubes (Wastes containing)
Scope	**The example provides guidance on carbon nanotubes present in any waste.**

Carbon nanotubes (CNTs) are cylindrical structures made of carbon having a diameter of a few nanometers. CNTs have very high tensile strength, excellent electrical conductivity, and the ability to bear high working temperatures. These properties mean there use is likely to become increasing wide-ranging.

This type of material may display physiological properties similar in nature to asbestos. For this reason we have adopted a precautionary approach and decided that unbound CNT[8] waste is to be classified as hazardous waste. The concentration threshold at which CNTs become hazardous is 0.1%. This should ensure a high level of protection for people and the environment.

Given this classification the most appropriate code for this type of waste is:

16 03 03* inorganic wastes containing hazardous substances MH

because there is evidence to suggest that CNTs could have the following hazardous properties:

- HP 6 Acute toxicity[9]
- HP 7 carcinogenic[10]
- HP 4 irritant

Example 14	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.

[8] Unbound, meaning not fixed within a matrix and capable of being inhaled.

[9] Pulmonary Toxicity of Single-Wall Carbon Nanotubes in Mice 7 and 90 Days after Intratracheal Instillation by Chiu-Wing Lam, John T. James, Richard McCluskey, and Robert L. Hunter

[10] cot.food.gov.uk/pdfs/cocsection2010.pdf

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.

Example 15	**Soil, stones and dredging spoil**
Scope	**This example provides guidance on the classification of waste soil (including excavated soil from contaminated sites), stones and dredging spoil.** **It does not apply if the material is not waste.**

15.1: Introduction

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 hazardous waste 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.

15.2: Assessment

Table 15.1 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 text in 15.4) (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 15.4)
- the hazard statement codes assigned to this worst case compound, and the hazardous properties associated with them (see explanatory test in 15.4

Does the waste possess any of the hazardous properties HP 1 to HP 15?

From identification of the hazardous substances and their properties in Table 15.1 the following hazardous properties need to be considered;

- HP3 Flammable
- HP4/HP8: Irritant and Corrosive
- HP5 Specific Target Organ Toxicity (STOT)/ Aspiration Toxicity
- HP6 Acute Toxicity
- HP7: Carcinogenic
- HP10: Toxic for Reproduction
- HP11: Mutagenic
- HP12: Produces Toxic gases in contact with water, air or acid
- HP13: Sensitising
- HP14: Ecotoxic

HP 3 Flammable : components of concern : TPH

- HP 3 (first and fourth bullets) 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 15.1	Results and elements used for subsequent assessment						
Determinand	**Units**	**Result**	**"Worst Case" compound**	**% conc. of worst case**	**Hazard Class 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 H310 H300 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 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	H332 H312 H302 H400 H410	HP6 HP6 HP6 HP14 HP14
Copper	mg/kg	400	copper(I) oxide	0.05%	Acute Tox. 4 * Aquatic Acute 1 Aquatic Chronic 1	H302 H400 H410	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. 1B[1]	H360Df H332 H302 H373** H400 H410 H350[1]	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 Aquatic Chronic 1	H350i H341 H360D*** H372** H332 H302 H315 H334 H317 H400 H410	HP7 HP11 HP10 HP5 HP6 HP6 HP4 HP13 HP13 HP14 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	H304 H373 H340 H350 H361d H411	HP5 HP5 HP11 HP7 HP10 HP14
Benzo[a]pyrene (BaP)	mg/kg	0.23					
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.							

[1]: All inorganic compounds of lead are classified as carcinogenic by IARC.

HP 4 Irritant /HP 8 Corrosive : components of concern: diarsenic trioxide and nickel carbonate.

These are additive hazardous properties. The concentrations of the different compounds with certain hazard statement codes are added together according to the procedures explained in Appendix C4 and C8.

The assessment below indicates that hazardous properties HP 4 irritant and HP8 Corrosive do not apply to this waste.

Hazards	Hazard Statement Code	Hazardous Waste Threshold 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

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

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 C5.

- The total concentration of H372 substances (nickel carbonate, 0.06%) is less that the 1% threshold for HP 5
- The total concentration of H373 substances (lead sulphate, 0.16%) is less than the 10% threshold for HP 5.
- The total concentration of H304 substances (TPH, 1.25%) is less than the 10% threshold for HP 5.
- The waste does not display the hazardous property HP 5.

HP 6 Acute Toxicity: components of concern: 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.

The cut-off (the level below which a substance can be excluded from the assessment) is however applied to each substance before this addition taken places. 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
- The waste does not display the hazardous property HP 6

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

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

- Diarsenic trioxide at 0.07% is below the 0.1% threshold for HP 7 (H350)
- Nickel carbonate at 0.06% is below the 0.1% threshold for HP 7(H350)
- Lead sulphate is subject to Note 1, which means the concentration of lead alone is used. The concentration of lead at 0.16% is at or above the 0.1% threshold for HP 7 (H350)
- 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% threshold for HP 7 (and HP 11)

(H350 and H340). So were considered further using marker compounds. The concentration is below the 3% concentration for HP 10 to apply (H361).

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 threshold 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 displaya 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

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

- Lead at 0.16% is below the 0.3% threshold for HP 10 (H360)
- Nickel carbonate at 0.06% is below the 0.3% threshold for HP10(H360)
- 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 threshold concentrations.

- Nickel carbonate at 0.06% is below the 1% threshold 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% threshold 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

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

- Nickel carbonate at 0.06% is below the 10% threshold 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

(TO BE COMPLETED ONCE INFORMATION ON METHODOLOGY IS PROVIDED BY THE COMMISSION)

15.3 Summary

The threshold values were exceeded for the hazardous properties HP 7 Carcinogenic and HP 14 Ecotoxic.

The waste is therefore classified under the EWC code 170503*, 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.

15.4: Explanatory notes for Table 15.1

Analytical results and use of moisture in adjusting concentrations

Depending on the laboratory method used an analysis may report a particular concentration as "dry weight" or similar. The hazardous waste classification should be made on the concentrations of substances in the waste so if dry weight concentrations are reported these need be converted to actual concentrations. The calculation for this depends on how the laboratory reports moisture content.

Chemical Speciation and worst case compounds

Assessment of a hazardous waste normally requires that the hazardous substances present are 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:

- undertake further analysis using other techniques (for example X-Ray Diffraction, XRD) to determine the identity the compounds present. However, this can be expensive and needs minimum levels of substances to be present 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 the Inventory 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

Once appropriate worse case compounds have been identified it is necessary to find the concentration of the compound (rather than just the identified anion or cation). 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.

Hazard statement codes from the Classification and Labelling Inventory (correct at time of publishing):

- Cadmium carbonate, lead sulphate and sodium cyanide are not listed as individual substances in harmonised entries in the Classification and Labelling Inventory. However harmonised general

entries are provided for unlisted compounds of these metals (or cyanide).

- The entries from cadmium and lead are also qualified by Note 1, which enables the use of metal cation concentration for the assessment.
- All the entries used were considered potentially incomplete entries, and additional hazard classes (or considered as set out in Appendix B.
- There is no single entry in the Classification and Labelling Inventory for TPH, in this case a worst case (in relation to hazard statement codes) has been used which is developed from C&L inventory entries (see example on waste oil and oil contaminated wastes).

Example 16	**Coal Tar**
Scope	**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 include all hydrocarbon fractions of the coal tar. Those based on PAH's alone are not consistent with the legislation.

The assessment of asphalt material as hazardous requires specific consideration to assess the material for the List of Wastes codes:

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

Determining the levels of coal tar present in "black top" can be difficult. Where road material is suspected of containing coal tar the waste is deemed to be hazardous unless it can be proven that the coal tar (including all of its constituent hydrocarbon compounds) is present at a concentration of less than 0.1%. Table 3.1 of the CLP uses benzo[a]pyrene as a marker compound for carcinogenicity for certain coal tar entries . 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 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 properly and representatively assessed.

Example 17	Soil and other construction and demolition waste containing or contaminated with asbestos
Scope	This example provides guidance on the assessment of wastes classified under chapter 17 of the EWC that contain 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.

Example 18	Waste medicines
Scope	**This example provides guidance on the classification of medicines waste from any source including manufacture, supply, healthcare or municipal sources.** **This does not apply to raw materials used in the manufacture of medicines, unless those raw materials are medicinal products themselves.**

The list provides the following codes for medicinal products that become waste:

18 01 08* Cytotoxic and cytostatic medicines	AH
18 01 09 Medicines other than those mentioned in 18 01 08	AN
18 02 07* Cytotoxic and cytostatic medicines	AH
18 02 08 Medicines other than those mentioned in 18 02 07	AN
20 01 31* Cytotoxic and cytostatic medicines	AH
20 01 32 Medicines other than those mentioned in 20 01 31	AN

Chapter 7 does not contain appropriate codes for waste medicinal products from pharmaceutical manufacture and supply. The codes from human or animal healthcare (chapter 18) should be used.

Medicines from healthcare (human or animal) would fall under chapter 18.

Patient returns from domestic households to community pharmacies would be coded in chapter 20.

To find the correct code it must be established whether or not the medicine is 'cytotoxic and cytostatic'. To be classed as 'cytotoxic and cytostatic' it must possess one or more of the following hazardous properties:

- Acute toxicity (HP 6)
- Carcinogenic (HP 7)
- toxic for reproduction (HP 10)
- mutagenic (HP 11)

Medicines, whether they are cytotoxic and cytostatic or not, may possess other hazardous properties that should be identified on accompanying documentation for Duty of Care purposes. Examples include HP 3 Flammable, HP 4 Irritant, and HP 14 Ecotoxic.

More information relating to these hazardous properties can be found in Appendix C. Once it has been established which type of medicine is being dealt with the correct code can be assigned.

Example 19	**Offensive hygiene wastes (Municipal)**
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 any quantity. A failure to segregate may have significant implications for the subsequent management of other waste it is mixed with.

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.*

Example 20	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 21	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 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

Hazardous components include hazardous accumulators/batteries (ones coded 16 06 01* to 16 06 03*); mercury switches; activated glass; mercury containing backlights and so on.

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. 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.

Appendix B:

Data sources

This Appendix provides guidance on how to determine

- if a substance is a hazardous substance, and
- the hazard statement codes that apply to a substance

B1.1 Waste assessment and classification

The assessment of hazardous properties is normally based upon identifying:

- The substances that are present in a waste, and
- The properties of those substance that are hazardous substances

This appendix sets out how to determine:

- if a substance is a hazardous substance, and
- the classification of a hazardous substance

This information can then be used to assess if a waste has a hazardous property and which List of Waste code applies to it.

B1.2 How to identify a hazardous substance and its classification

A hazardous substance is a substance that is assigned a hazard statement code when assessed using the procedures set out in the Classification, Labelling and Packaging of Substances and Mixtures Regulation 1272/2008(CLP).

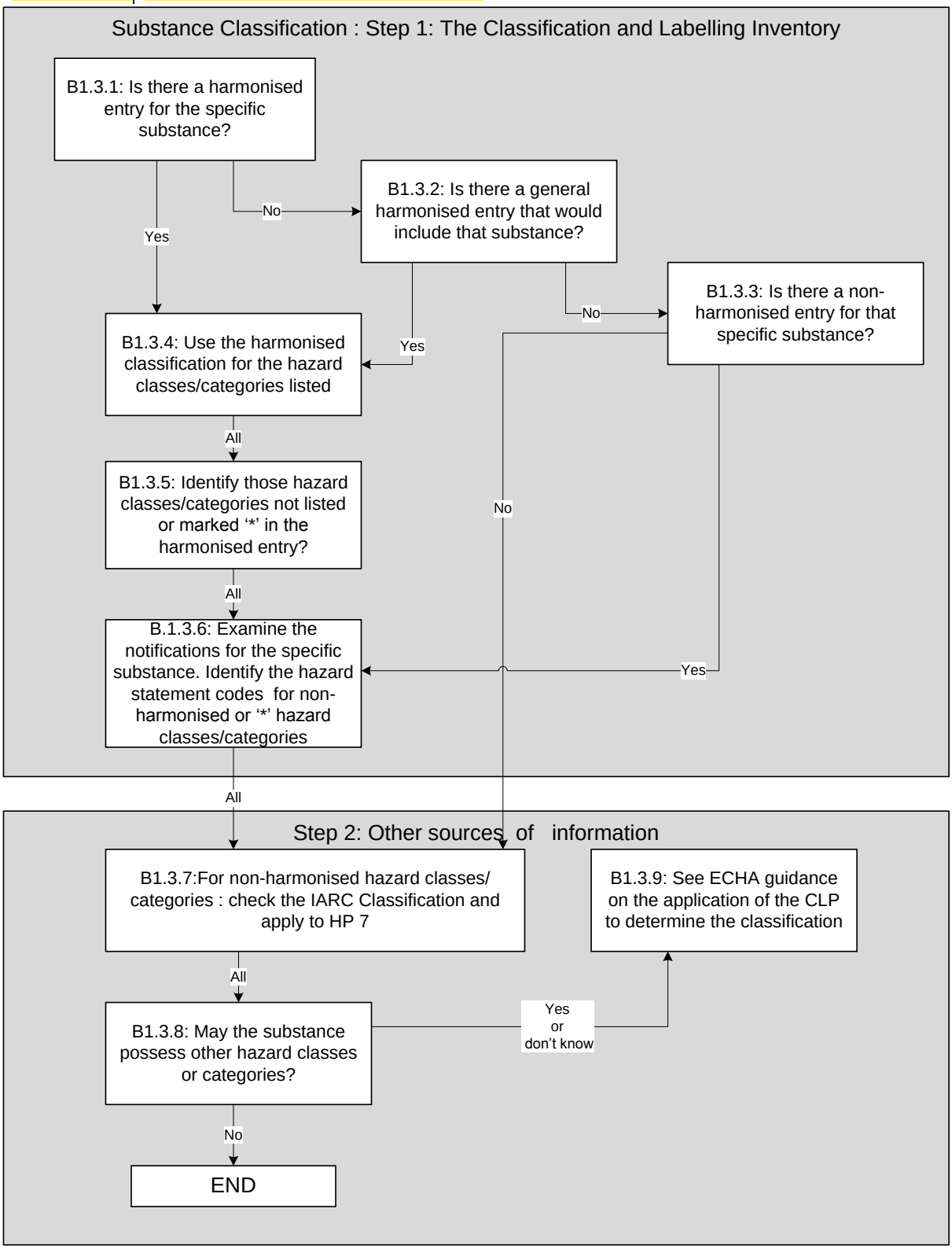
These will fall into three groups:

- substances listed in Table 3.1 of the (CLP)
- unlisted substances notified to the European Chemical Agency in accordance with the CLP
- other unlisted substances.

Section B1.3 (and Figure B1.1) sets out the steps that should be followed to determine the classification of these substances.

Note: The classifications of any chemicals used as examples in this chapter were correct at the time of publication. They may have changed since. Use the data sources indicated here, not the classifications presented in these examples, to determine the current classification of these substances.

Figure B1.1 Decision tree for the use of data sources



B1.3 The Classification and Labelling Inventory

The Classification and Labelling Inventory is the CLP database maintained by the European Chemical Agency (ECHA). The database contains:

- The harmonised substances from Table 3.1 of the CLP (as amended by Adaptations to Technical Progress), and
- Classifications of other substances notified to the European Chemical Agency (for any purpose)

The Inventory should be used as set out in the following paragraphs. We will use lead chromate, lead sulphate, and copper dihydroxide to illustrate the steps.

B1.3.1 Is there a harmonised entry for the specific substance?

The first step is to identify if there is a 'harmonised entry' for the specific substance in the Inventory.

A 'harmonised entry' is a listing from Table 3.1 of the CLP (as amended by adaptations to technical progress). The hazard classes and categories presented here have legal precedence over all other sources of information for the classification of the substance.

The Inventory has a search page that enables you to find these entries.

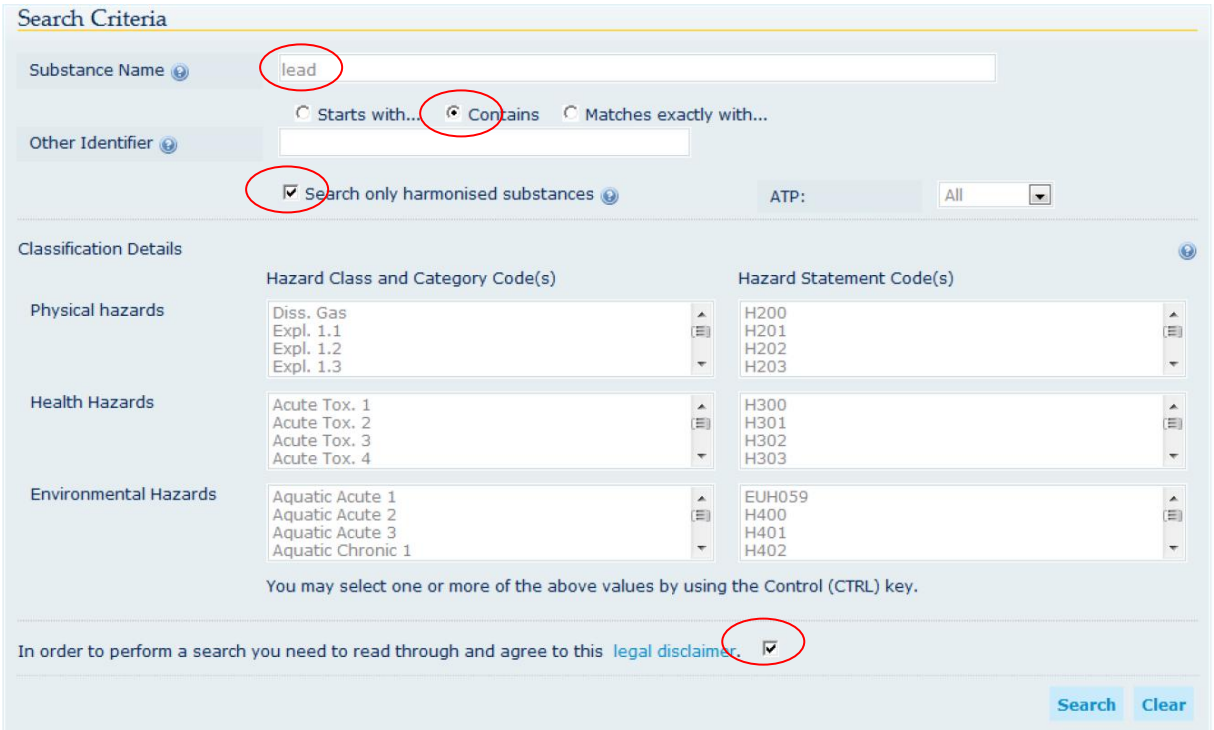
http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database

- Enter the chemical name in 'substance name' field (or use other identifiers)
- Tick the 'search only for harmonised substances', and
- 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 chemicals may have several names.

In the Figure B1.2 below we have searched for 'lead' to find a harmonised entry for lead Chromate.

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



This search retrieves a list of all harmonised entries for lead including both substance specific and general compound entries.

Figure B1.3 Example of the results of a search in the Classification and Labelling Inventory

Showing 18 results.

#	Index Number	EC Number	CAS Number	Name	View
1	009-014-00-1	247-278-1	25808-74-6	lead hexafluorosilicate	
2	028-050-00-9		68130-19-8	silicic acid, lead nickel salt	
3	082-001-00-6			lead compounds with the exception of those specified elsewhere in this Annex	
4	082-002-00-1			lead alkyls	
5	082-003-00-7	236-542-1	13424-46-9	lead diazide lead azide	
6	082-003-01-4	236-542-1	13424-46-9	lead diazide lead azide [≥ 20 % phlegmatiser]	
7	082-004-00-2	231-846-0	7758-97-6	lead chromate	
8	082-005-00-8	206-104-4	301-04-2	lead di(acetate)	
9	082-006-00-3	231-205-5	7446-27-7	trilead bis(orthophosphate)	
10	082-007-00-9	215-630-3	1335-32-6	lead acetate, basic	
11	082-008-00-4	401-750-5	17570-76-2	lead(II) methanesulphonate	
12	082-009-00-X	215-693-7	1344-37-2	lead sulfochromate yellow C.I. Pigment Yellow 34 [This substance is identified in the Colour Index by Colour Index Constitution Number, C.I. 77603.]	
13	082-010-00-5	235-759-9	12656-85-8	lead chromate molybdate sulfate red C.I. Pigment Red 104 [This substance is identified in the Colour Index by Colour Index Constitution Number, C.I. 77605.]	
14	082-011-00-0	232-064-2	7784-40-9	lead hydrogen arsenate	
15	082-012-00-6	431-780-4	199876-46-5	barium calcium cesium lead samarium strontium bromide chloride fluoride iodide europium doped	
16	604-074-00-0	201-236-9	79-94-7	tetrabromobisphenol-A 2,2',6,6'-tetrabromo-4,4'-isopropylidenediphenol	
17	609-019-00-4	239-290-0	15245-44-0	lead 2,4,6-trinitro-m-phenylene dioxide lead 2,4,6-trinitroresorcinoxide lead styphnate	
18	609-019-01-1	239-290-0	15245-44-0	lead 2,4,6-trinitro-m-phenylene dioxide lead 2,4,6-trinitroresorcinoxide lead styphnate (≥ 20 % phlegmatiser)	

We identify the entry for lead chromate and click on the 'magnifying glass' symbol the right. This results in the following harmonised classification appearing.

Note:

To aid identification the inventory includes

- Certain alternative chemical names in the **'International Chemical Identification'** section, and
- The Chemical Abstract Service (**CAS**) number, which is the most accurate identification of a substance that may have many non-standard names.

Figure B1.4 Example of a 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 Number	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 3.1)

Classification		Labelling			Specific Concentration limits, M-Factors	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
Repr. 1A	H360Df	H360Df				
STOT RE 2	H373 **	H373 **				
Aquatic Acute 1	H400					
Aquatic Chronic 1	H410	H410				

B1.3.2 Is there a general harmonised entry that would include that substance?

If there is no 'harmonised entry' for the specific substance in the Inventory, you must repeat the previous step to check for a general harmonised entry for a group of related substances that includes that substance.

There are a number of these, with examples include arsenic, lead, cadmium, chromium, mercury, tin, antimony, beryllium, barium and cyanide compounds.

We recommend that you search for these in the same manner as described (ticking the *'search only for harmonised substances'* box) in the previous step but

(i) Using a partial substance name (e.g. lead) or group name where relevant, and

(ii) If this identifies no relevant entry, you can produce list containing most of the general harmonised entries by entering 'exception' in the substance name field.

So, a search for 'lead sulphate' would identify no substance specific harmonised entry, but a search for 'lead' would identify the following harmonised entry for '*lead compounds with the exception of those specified elsewhere in this annex'* that applies to all lead compounds that do not have a substance specific entry.

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

Figure B1.5 Example of a 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 Number	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 3.1)

Classification		Labelling			Specific Concentration limits, M-Factors	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		GHS07 GHS09 GHS08 Dgr	* Repr. 2; H361f: C ≥ 2.5% STOT RE 2; H373: C ≥ 0,5%	Note A Note 1
Acute Tox. 4 *	H332	H332				
Repr. 1A	H360Df	H360Df				
STOT RE 2 *	H373 **	H373 **				
Aquatic Acute 1	H400					
Aquatic Chronic 1	H410	H410				

B1.3.3 Is there a non-harmonised entry for that substance?

If there is no general or specific 'harmonised entry' for the substance in the Inventory, you should repeat the first step to check for a non-harmonised entry.

- Enter the substance name in 'substance name' field (or use other identifiers), and
- Remove the tick for 'search only for harmonised substances',

A non-harmonised entry is information that manufacturers and suppliers of that substance have submitted to the European Chemical Agency for the purpose of inclusion in the Inventory.

The consequence of this is that there are normally multiple submissions that may differ.

Figure B1.6 illustrates four of the results of a search for copper dihydroxide.

Figure B1.6 | 4 notifications from a non-harmonised entry from the Classification and Labelling Inventory

Summary of Classification and Labelling

Notified classification and labelling

General Information

Discuss (0)

EC Number	EC Name	CAS Number
243-815-9	copper dihydroxide	20427-59-2

Notified classification and labelling according to CLP criteria

Classification		Labelling			Specific Concentration limits, M-Factors	Notes	Classification affected by Impurities / Additives	Additional Notified Information	Number of Notifiers	Joint Entries	View
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		GHS07 Wng				State/Form IUPAC Names	119		
Eye Irrit. 2	H319	H319									
Acute Tox. 4	H302	H302		GHS07 GHS09 GHS05 Dgr				State/Form IUPAC Names	94		
Eye Dam. 1	H318	H318									
Acute Tox. 4	H332	H332									
Aquatic Chronic 2	H411	H411									
Acute Tox. 4	H302	H302		GHS05 Dgr				IUPAC Names	47		
Eye Dam. 1	H318	H318									
Acute Tox. 4	H332	H332									
Aquatic Acute 1	H400	H400									
Aquatic Chronic 1	H410	H410									
Acute Tox. 4	H302	H302		GHS06 GHS09 GHS05 Dgr				State/Form IUPAC Names	35		
Eye Dam. 1	H318	H318									
Acute Tox. 3	H331	H331									
Aquatic Acute 1	H400										
Aquatic Chronic 1	H410	H410									

B1.3.4 Use the harmonised classification for the hazard classes/categories listed

The **'Harmonised Classification'** contains the following information that is used for waste assessment:

'Classification'

- 'Hazard Class and Category Code(s)
- 'Hazard Statement Code(s)

'Labelling'

- Supplementary Hazard Statement Code(s)

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

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 chemical classification purposes.

So from Figure B1.5 the harmonised hazard classes, categories and statement codes for lead sulphate are

- Acute Tox. 4* H302
- Acute Tox. 4* H332
- Repr. 1A H360Df
- STOT RE 2* H373**
- Aquatic Acute 1 H400
- Aquatic Chronic 1 H410

B1.3.5: Identify those hazard classes/categories not listed or marked '*' in the harmonised entry?

The harmonised entries are often incomplete. So any hazard classes and hazard categories that are not listed in the harmonised entry must also be considered further.

Before proceeding to the next step, identify which hazard classes and categories

- are not presented in the harmonised classification, or
- are marked with an '*' indicating that it is a minimum classification,

The latter is particularly relevant for general harmonised entries (see Figure B1.5).

So for lead sulphate the following need to be considered further

- 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)

B1.3.6: Examine the notifications for the specific substance. Identify the hazard statement codes for non-harmonised or '*' hazard classes/categories

Where there is no harmonised entry the following approach should be taken

(i) Examine all of the notifications, and

(ii) Identify the hazard statement code(s) listed for each hazard class and category of danger, and

Either

(iii) Use the worst case hazard statement code for each hazard class and category of danger waste classification purposes

OR

(iv) Undertake an assessment of the classification of the substance in the form present in the waste (in accordance with the CLP and the ECHA guidance on its application) to determine which hazard statement code(s) is applicable (see text below)

Where there is a harmonised entry this would only apply to those hazard classes and categories identified in B1.3.5.

- For a general harmonised entry you will need to search for a non-harmonised entry for that specific substance. For example there is a substance specific non-harmonised entry for lead sulphate.

- For a substance specific harmonised entry, the notifications should be on the same page, below the harmonised classification.

A notification will contain a hazard statement where a manufacturer or supplier has sufficient information to determine the classification under that hazard class and category. There can be multiple classifications for the same substance due to, for example,

- the different composition, form or physical state of the substance placed on the market, or
- a manufacturer or producer having insufficient information to assess that hazard class or category (which they will report as 'data lacking', 'inconclusive', or 'conclusive but not sufficient for classification')

For that reason the worst case should be used unless:

- the waste was a product for which the manufacturer has provided a safety data sheet, and that clearly indicates that sufficient data existed to conclusively exclude that hazard class (as opposed to 'data lacking' or 'inconclusive' etc.), or
- additional work has been undertaken that clearly demonstrates that the evidence upon which the worst case is based is not applicable to the waste in question.

B1.3.7 For non-harmonised hazard classes/categories : check the IARC Classification and apply to HP 7

Where there is no-harmonised entry, or the harmonised entry does not address carcinogenicity, the definitive data source for information of HP 7 Carcinogenic is the International Agency for Research on Cancer (IARC).

IARC publishes and maintains a list that includes substances classified as carcinogens on their website at http://monographs.iarc.fr/ENG/Classification/ClassificationsAlphaOrder.pdf which should be used to assess HP 7.

You should only use the IARC list to determine if a substance is a carcinogenic substance. (Note: the IARC list includes classifications for other carcinogens too).

This organisation uses a different categorisation of carcinogens but the following table may be used for conversion.

For example, for lead sulphate, IARC have classified all Inorganic Lead Compounds as Group 2A (equivalent to Carc.1B H350).

IARC Group	IARC Description	CLP Group	CLP Description (Summary)	Hazard Statement Code
Group 1	Carcinogenic to humans	Category 1A	known to have carcinogenic potential for humans, classification is largely based on human evidence	Carc. 1A H350
Group 2A	Probably carcinogenic to humans	Category 1B	presumed to have carcinogenic potential for humans, classification is largely based on animal evidence	Carc. 1B H350
Group 2B	Possibly carcinogenic to humans	Category 2	Suspected human carcinogens	Carc. 2 H351
Group 3	Not classifiable as to its carcinogenicity to humans	n/a	No Equivalent in CLP	n/a
Group 4	Probably not carcinogenic to humans	n/a	No Equivalent in CLP	n/a

B1.3.8: May the substance possess other hazard classes or categories?

If the substance is listed in the Inventory and you have checked IARC, we would not normally expect other data sources to be considered unless the producer or holder of the waste had reason to believe it may fall within another hazardous class or category.An example of this might be where the manufacturer or supplier of a product has identified an additional property for that substance on the safety data sheet for the product that has become waste.

If the substance is not listed in the Inventory, the producer or holder of the waste must determine whether or not it is a hazardous substance, and what hazard classes or categories it falls within.

- If the waste was a product for which the manufacturer has provided a Safety Data Sheet, use the classification of the substance provided.
- If not, check other data sources.

We would expect waste producers or holder to (as a minimum) undertake an initial assessment of other data sources to determine if there is reason to believe that the substance may be a hazardous substance. More detailed assessment would only be needed if this assessment indicated that this may be the case.

B1.3.9: See ECHA guidance on the application of the CLP to determine the classification

The European Chemical Agency (ECHA) provides guidance on the application of the CLP that explains how to apply the CLP to classify a substance.

If the manufacturer or supplier of a substance has already applied this and produced a Safety Data sheet for that substance, that can normally be relied for hazard classes and categories not addressed by the Inventory.

B1.4 Further notes on using the Classification and Labelling Inventory

B1.4.1 Qualifications of hazard class, category codes and statements codes

The following may be assigned to entries in the classification column of Table 3.1 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.	Yes
**	Relates to route of explosure	No
***	Assigned to reproductive toxicity hazard statements where one atrribute 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

B1.4.2 Supporting 'Notes' column

The CLP contains two series of supporting **'Notes'** that appear in the Inventory.

- The alphabetic series (Note A, B, etc.) labelled '**Notes'** apply to substances and are only relevant to hazardous waste assessment where they alter the '**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 preparations and show how the concentration limits for a substance are applied to a mixture. Notes 1, 2, 3 and 5 can be used where appropriate. These are applied to the concentration limits given in this document for waste assessment, rather than those listed in the CLP. (note 1, for example, is applicable to any hazardous properties where the calculation method is used).

B1.5 Using Safety Data Sheets to support steps B1.3.1 to B1.3.9

A safety data sheet (SDS) may be used to support:

- paragraph 2.3.1 of Chapter 2, and
- steps B1.3.6 to B1.3.9.

The quality and completeness of SDS's may vary so it is important to ensure that

- the SDS is a European, REACH/CLP compliant SDS, and
- there are no significant gaps or omissions where properties have not been addressed.

B1.5.1 A SDS for that preparation

Where the waste contains a product that was a preparation (mixture), for example paint, the product manufacturer's SDS may used as follows

Section 2 **'*Hazards Identification'*** will provide

- information on the physical properties of the preparation (relevant to HP 1, HP 2 and HP 3) and considered under B1.3.8

Section 3 **'*Composition/Information on Ingredients'*** will provide information used by paragraph 2.3.1 of Chapter 2 including:

- the identity of substances present in a mixture or preparation (for example paint)
- the concentration of these substances

Where the safety data sheet gives a range or concentrations or a less than (for example <1%) use the highest concentration that that allows (for example 0.99%)

This information may not be correct if the composition of the preparation has changed. For example if the liquid product has dried or become contaminated with another substance.

The information on classification of a substance should be applied as indicated in B1.5.2.

B1.5.2 A Safety Data Sheet for that substance

Where the waste contains a product that was a substance, the product manufacturer's SDS may used as follows:

Section 2 ***'Hazards Identification'***, will provide information on the classification of the substance. This may differ from that given in the Inventory should be applied as follows:

Inventory Classification	SDS Classification
Harmonised hazard class and category	Use the classification provided by the SDS only where • it provides a higher classification than a minimum ('*') classification in the harmonised class/category. • The hazard class/category is labelled '****'
Non-harmonised hazard class and category	Use the classification provided by the SDS to • support worst case selection (see B1.3.6), if sufficient information is provided in sections 9 to 12. • identify any additional hazard class and category that may apply (B1.3.8)
Substance not listed in inventory	Use the classification provided by the SDS to support B1.3.8 and B1.3.9. Consult the manufacturer if there are any significant gaps or omissions in the SDS.

B1.5.3 Other safety data sheets

Where the waste is not a product for which a specific SDS is available from its manufacturer or supplier, the SDS should only be used for a substance that is not listed in the inventory.

In those circumstances we would strongly recommend that a range of data sources are considered and the worst case is used for the substance classification.

B1.6 Assessment tools produced by third parties

A number of hazardous waste assessment tools are produced by third parties. These should be used with caution unless the user is confident that the results produced are entirely consistent with this guidance. The Agencies endorse none of these tools. Issues to consider include:

- is the assessment tool updated regularly to reflect new versions of this guidance?
- are the chemical classifications used consistent with the Inventory?
- Are chemical classifications checked and updated after each adaptation to technical progress (which occur frequently)
- how does the tool deal with unlisted substances?
- how does the tool deal with a mixed waste?
- how does the tool deal with the reliability and appropriateness of the sampling approach employed?

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Appendix C:

Hazardous Property Assessment

This appendix must be used in association with the main body of WM3. It can be used to:

- determine whether or not a hazardous property applies to a mirror entry waste;
- decide if a mirror entry waste is hazardous or not.

Additionally this appendix can be used to:

- determine the hazardous properties that are displayed by absolute hazardous wastes for consignment note purposes.

This appendix gives:

- a definition and interpretation of each hazardous property;
- the "hazard statement codes" linked to the hazardous property;
- an assessment flow chart;
- threshold concentrations, where applicable;
- test methods, where applicable.

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Appendix C:

C1 Assessment of Hazard HP 1: Explosive (entire chapter replaced)

C1.1 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"

C1.2 Limiting concentration

A waste isn't assessed for HP 1 with reference to limiting concentrations of substances. The WFD however 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 assigned 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

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		

[1] Council Directive 2008/98/EC

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.

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.

C1.3 Cut off value for organic peroxides

A waste containing organic peroxides classified as H240 or H241 does not need to be assessed for HP 1 if both:

- No other hazardoous substances assigned hazard statement codes listed in Table C1.1 are present, and
- One of the following two criteria is met
  - (i) The waste contains >1% but ≤ 7% hydrogen peroxide, and the available oxygen content of the organic peroxide(s) is ≤ 0.5%
  - (ii) The waste contains ≤ 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 C2.1. An example of how a waste containing an organic peroxide can be assessed for HP 1 is given in Box C2.2.

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

$$Oi\ (\%) = \sum\left(16 \times \left(ni \times ci / mi\right)\right)$$

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 (ii) applies.

Methyl ethyl peroxide has

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

$$O_i\ (\%) = \sum\left(16 \times \left(ni \times ci / mi\right)\right)$$

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

= 16 x 1 x 2.9 / 76

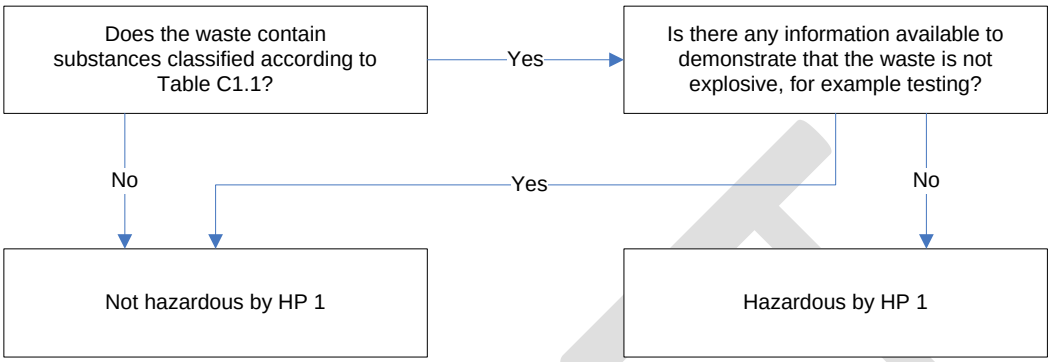
= 0.61%

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

C1.4 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 H1



C1.5 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 wastes 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(entire chapter replaced)

C2.1 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*"

C2.2 Limiting concentration

A waste isn't assessed for HP 2 with reference to limiting concentrations of substances. The WFD however 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 assigned 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 a specific concentration limit is given in Annex VI Table 3.1 to CLP (as presented in a harmonised entry in the Classification and Labelling Inventory) and the oxidising substance is present in the waste below that limit, it shall be assumed that the waste is not hazardous by HP 2. For example nitric acid is listed in CLP as H272: Ox. Liq. 3 but 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.

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

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		

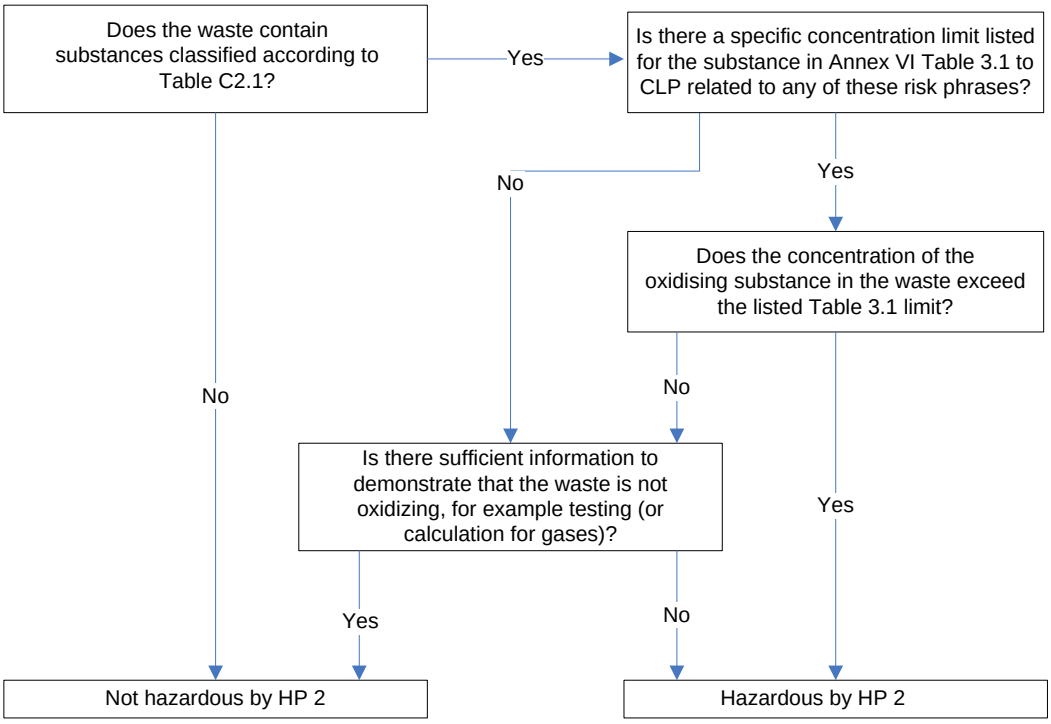
C2.3 Calculation method for oxidising gases

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.

C2.4 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



C2.5 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(entire chapter replaced)

C3.1 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.*"

C3.2 Limiting concentration

A waste isn't assessed for HP 3 with reference to limiting concentrations of substances. The WFD however 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 assigned in Table C3.1 can be tested to show whether it displayss 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 Section 3.4 below.

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

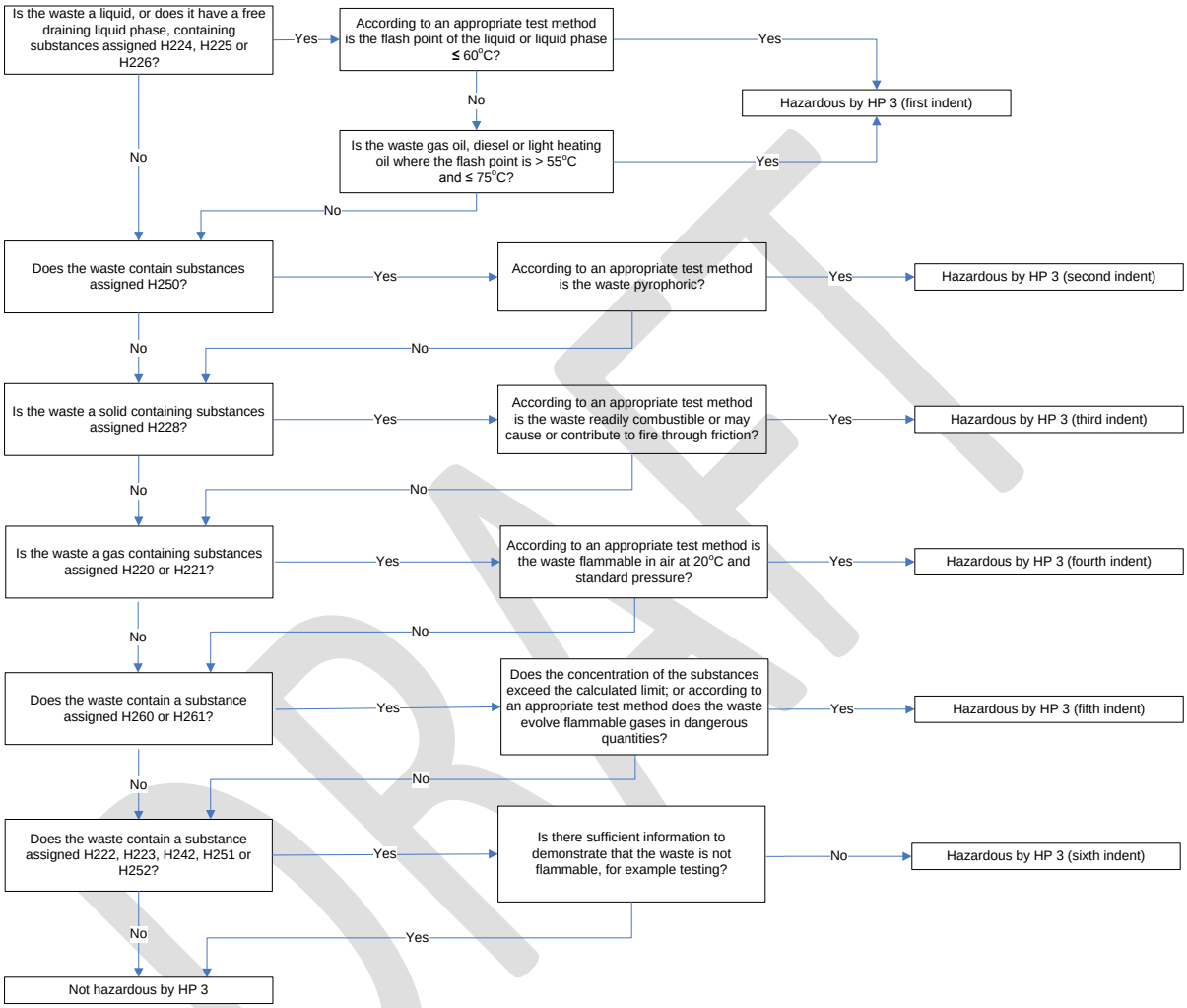
Table C3.1 Hazard Class and Category Code(s) and Hazard statement Code(s) for waste constituents for the classification of wastes as hazardous by HP 3

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

C3.3 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



Notes:

- 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.

C3.4 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 (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 (fifth indent) and their threshold concentrations

Substance name	Risk Phrases associated with H3-A (fifth indent)	Equation	Threshold concentration 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.

C3.5 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 (entire chapter replaced)

C4.1 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.

C4.2 Limiting concentration

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***
Skin corr. 1A	H314	Causes severe skin burns and eye damage	≥1% and <5%
Eye Dam. 1	H318	Causes skin irritation	10%
Skin irrit. 2 + Eye irrit. 2	H315 + H319	Causes serious eye damage + Causes serious eye irritation	20%

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

It can be difficult to isolate the exact substances present in a complex waste. pH can be used to indicate if a complex waste may be irritant.

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 consideration of acid/alkali reserve alone should not be used to exonerate waste from classification as Corrosive or Irritant.

C4.3 Cut-off values

The following cut-off values apply to the assessment:

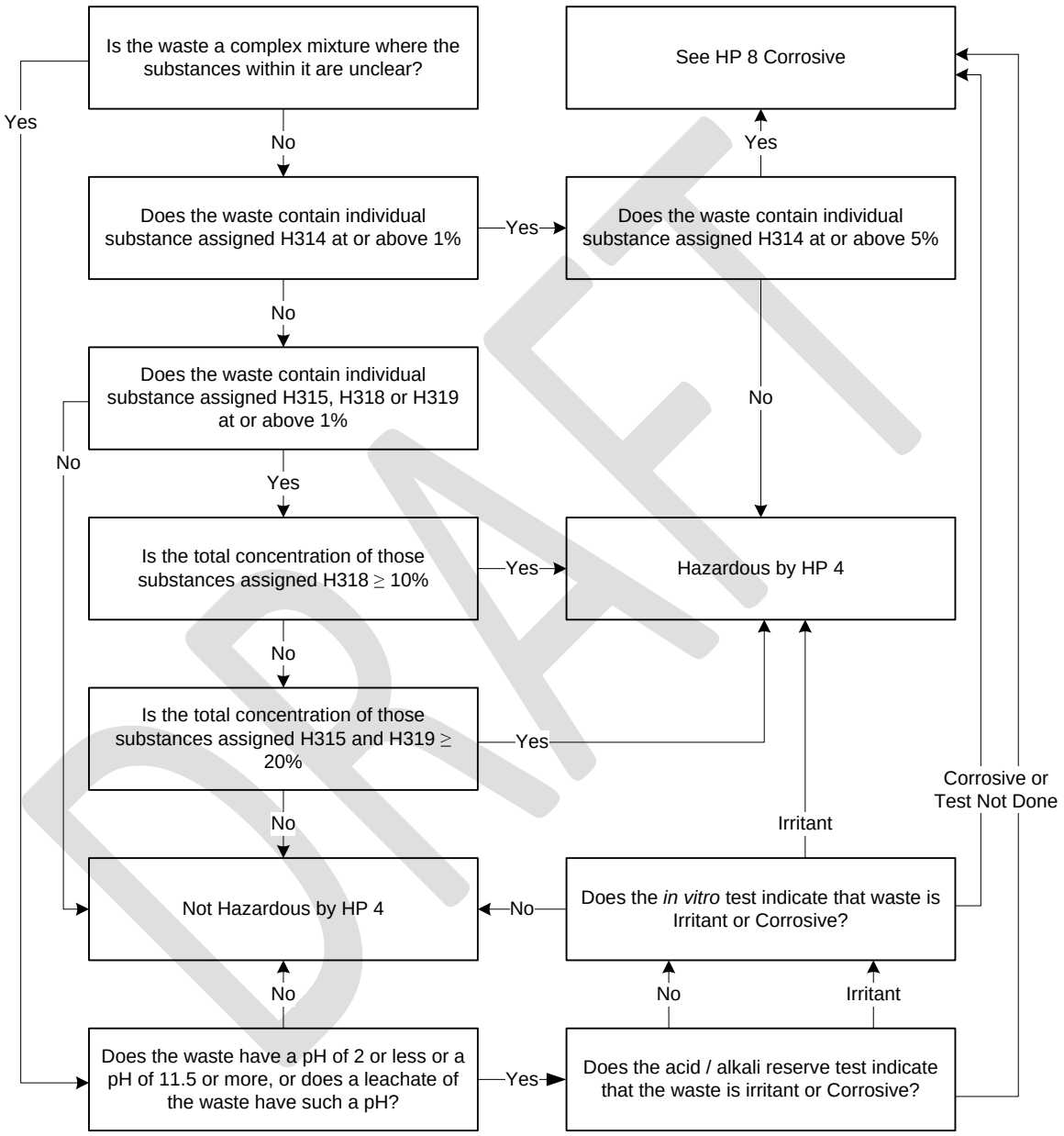
- For H314, H315, H318 and H319 the cut off value is 1%.

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.

C4.4 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



C4.5 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 assessed for corrosive 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].

[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

(entire chapter replaced)

C5.1 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*"

C5.2 Limiting concentration

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 C1.5] 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]

C10.3 Cut-off values

No cut-off values apply to this assessment.

Table C1.5 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

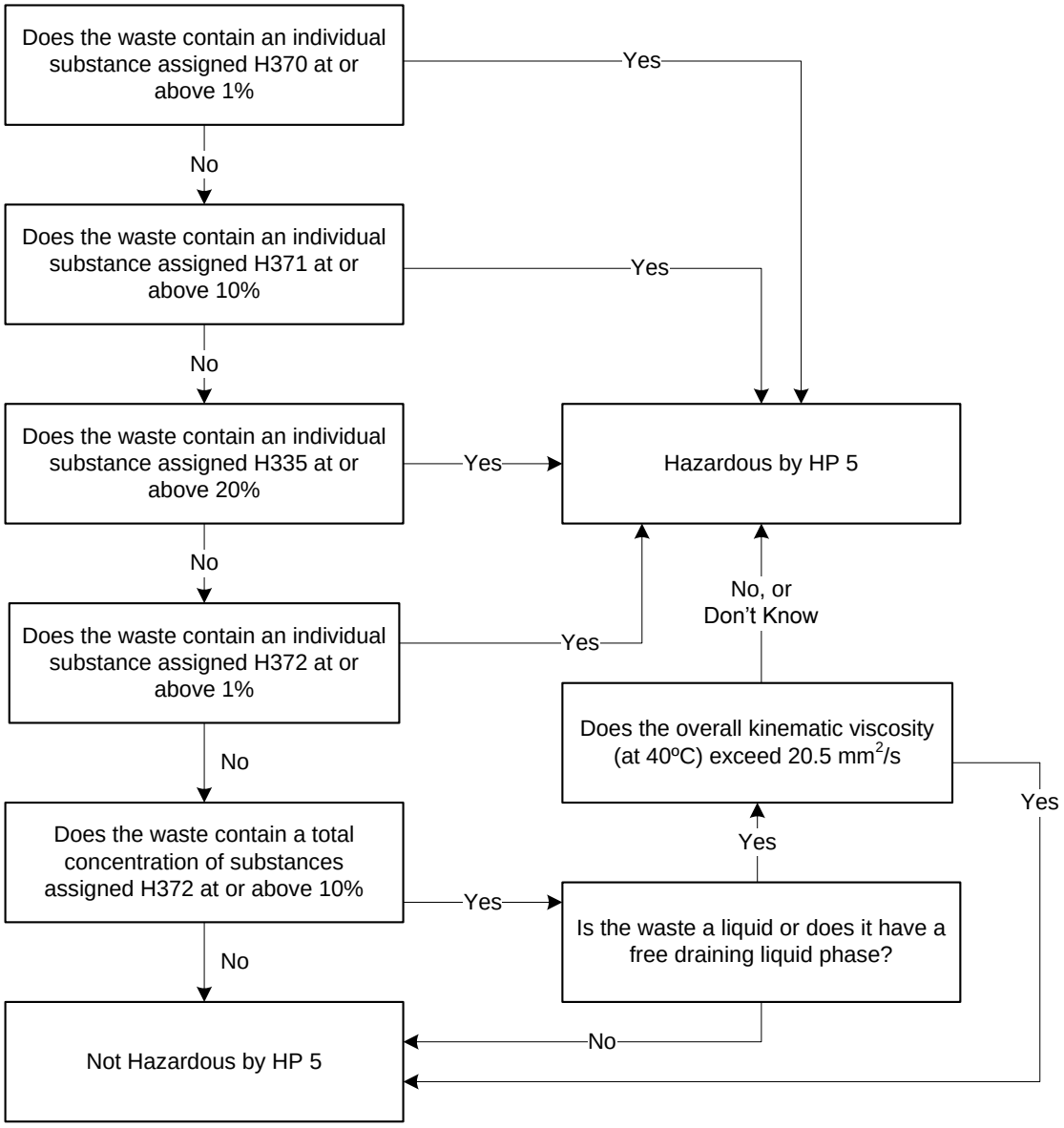
Hazard Class and Category Code(s)	***Hazard statement Code(s)***	***Description***	***Concentration limit***
STOT SE 1	H370	Causes damage to organs	1%
STOT SE 2	H371	May cause damage to organs	10%
STOT SE 3	H335	May cause respiratory irritation	20%
STOT RE 1	H372	Causes damage to organs through prolonged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

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

C5.4 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



C5.5 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 Hazards HP 6: Acute Toxicity(entire chapter replaced)

C6.1 Definition

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

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

C6.2 Limiting concentration

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.

C6.3 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

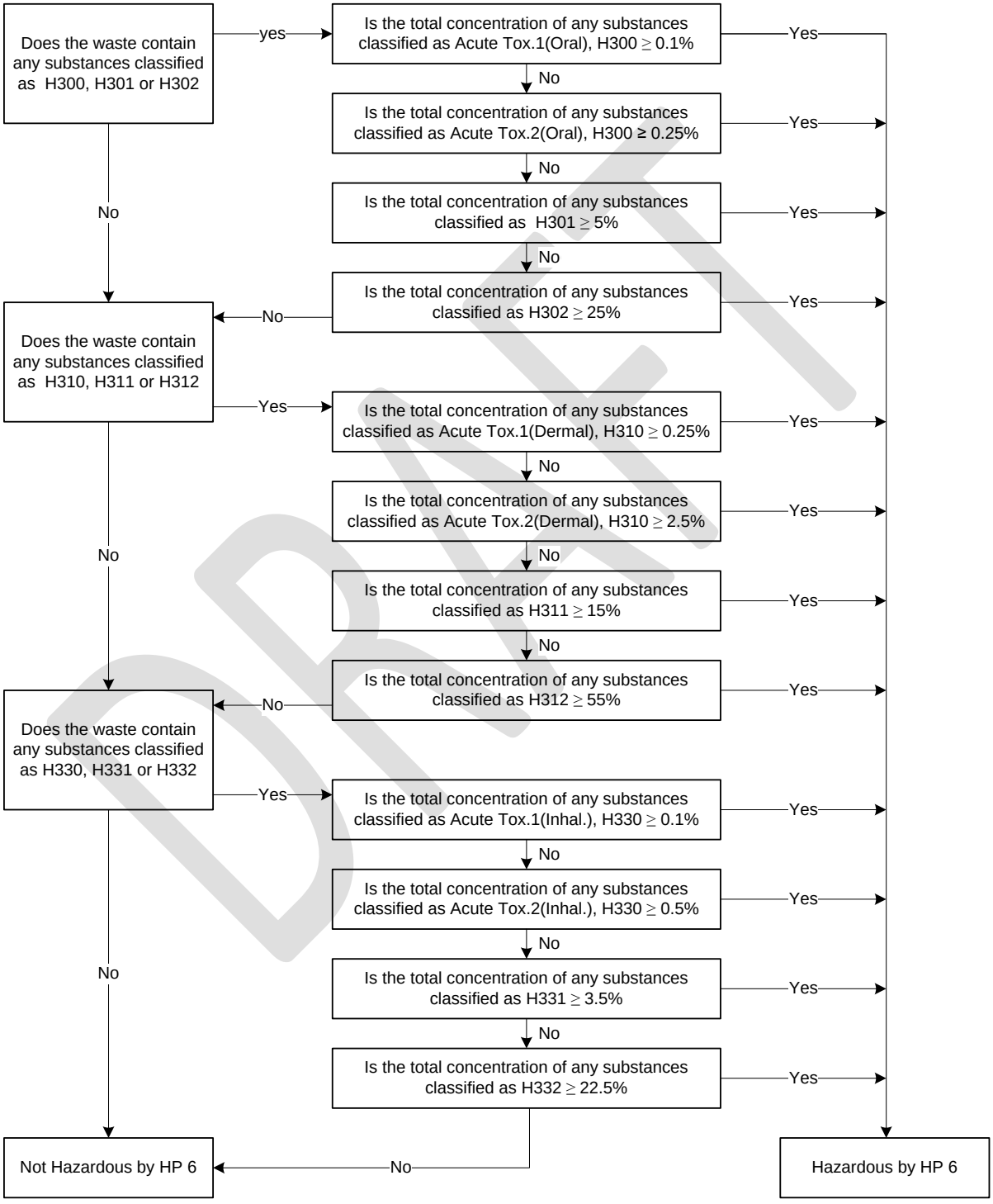
Hazard Class and Category Code(s)	Hazard statement Code(s)	Description	Concentration limit (sum of substances)
Acute Tox.1 (Oral)	H300	Fatal if swallowed	0.1%
Acute Tox. 2 (Oral)	H300	Fatal if swallowed	0.25%
Acute Tox. 3 (Oral)	H301	Toxic if swallowed	5%
Acute Tox 4 (Oral)	H302	Harmful if swallowed	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%

C6.4 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



C6.5 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 Hazards HP 7: Carcinogenic(entire chapter replaced)

C7.1 Definition

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

"*waste which induces cancer or increases its incidence*"

C7.2 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.

C7.3 Cut-off values

No cut-off values apply to this assessment.

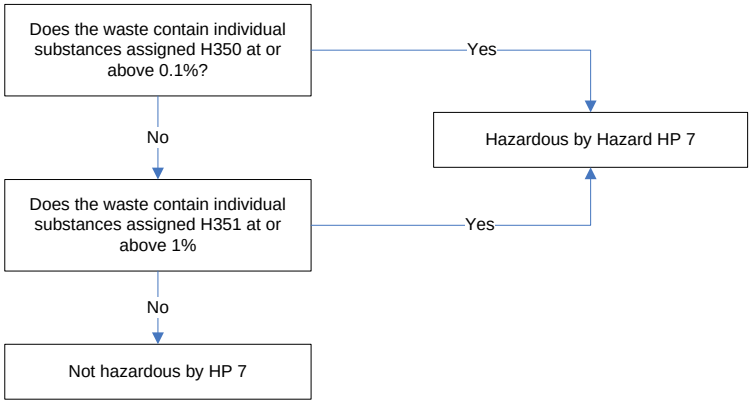
Table C7.1 Hazard Class and Category Code(s) and Hazard statement Code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 7

Hazard Class and Category Code(s)	Hazard statement Code(s)	Description	Concentration limit
Carc. 1A	H350	May cause cancer	0.1%
Carc. 1B			
Carc. 2	H351	Suspected of causing cancer	1.0%

C7.4 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



C7.5 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(entire chapter replaced)

C8.1 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.

C8.2 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

Hazard Class and Category Code(s)	***Hazard statement Code(s)***	***Description***	***Concentration limit***
Skin corr. 1A	H314	Causes severe skin burns and eye damage	≥ 5%

It can be difficult to isolate the exact substances present in a complex waste. pH can be used to indicate if a complex waste may be corrosive

A waste with a pH ≤ 2 or ≥ 11.5 should be considered 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 consideration of acid/alkali reserve alone should not be used to exonerate waste from classification as corrosive.

C8.3 Cut-off values

The following cut-off values apply to the assessment:

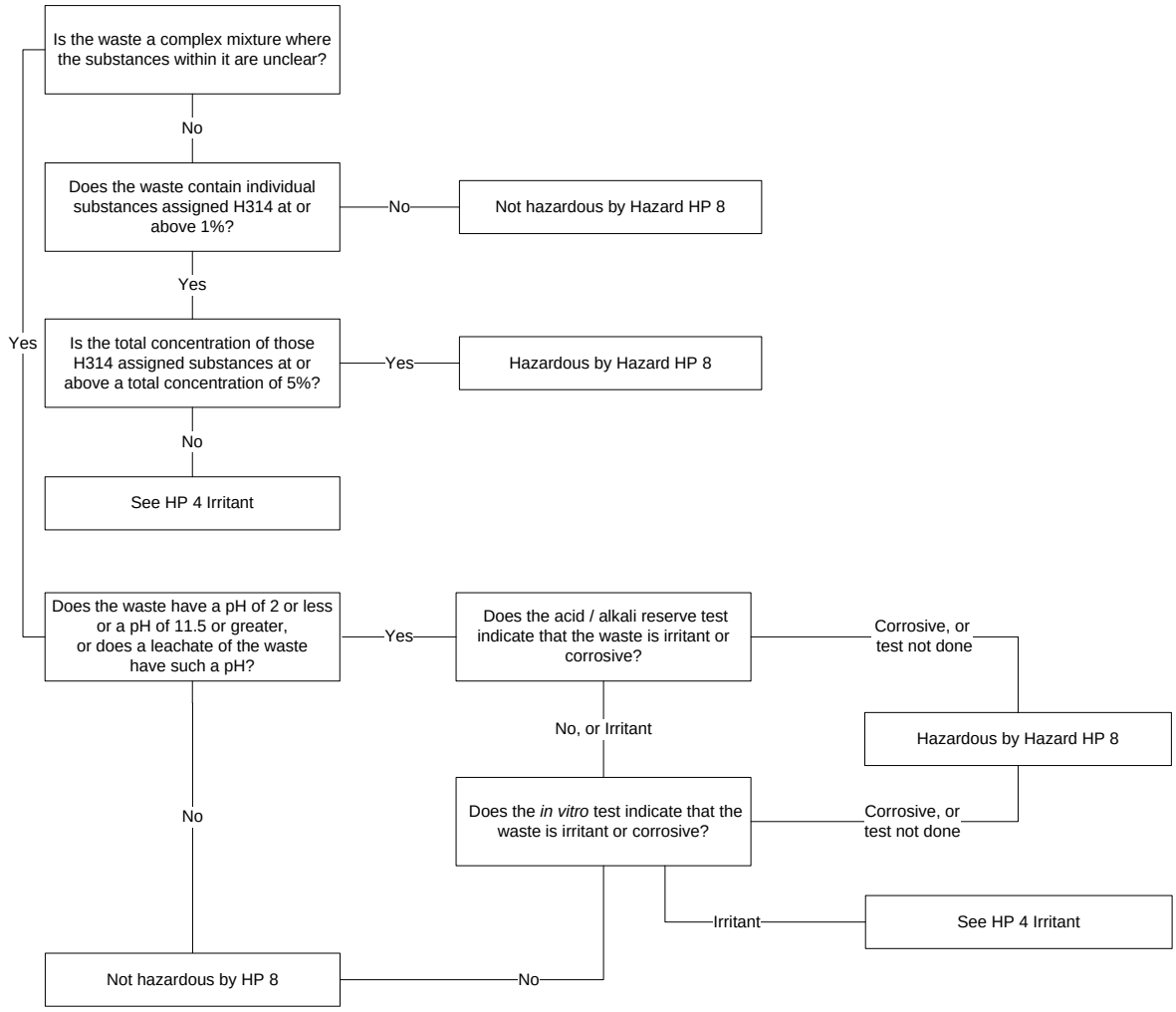
- For H314 : 1%;

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

C8.4 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



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.

Appendix C:

C9 Assessment of Hazards HP 9: Infectious (minor update)

C9.1 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.*”

C9.2 Limiting concentration

A waste isn’t assessed for HP 9 with reference to limiting concentrations of chemical substances. The WFD however 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 H9 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”.

C9.3 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:

(i) 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

(ii) 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

(iii) 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].

C9.4 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 Hazards HP 10: Toxic for reproduction

(entire chapter replaced)

C10.1 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*"

C10.2 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 7 [see Table C1.10], 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.

C10.3 Cut-off values

No cut-off values apply to this assessment.

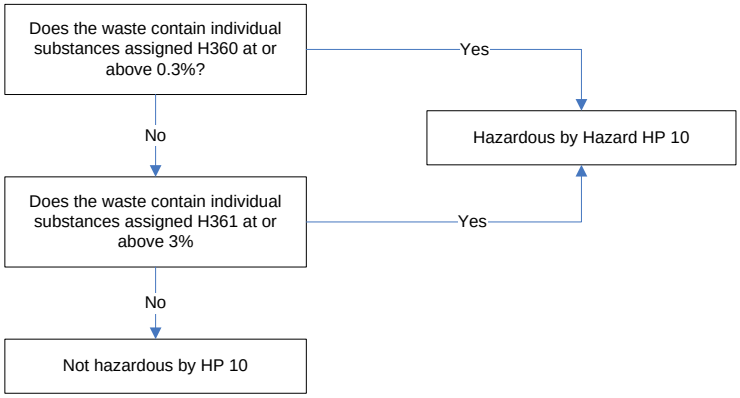
Table C1.10 Hazard Class and Category Code(s) and Hazard statement Code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 10

Hazard Class and Category Code(s)	***Hazard statement Code(s)***	***Description***	***Concentration limit***
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%

C10.4 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



C10.5 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].

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

Appendix C:

C11 Assessment of Hazards HP 11: Mutagenic

(entire chapter replaced)

C11.1 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*"

C11.2 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 8 [See Table C1.11], 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.

C11.3 Cut-off values

No cut-off values apply to this assessment.

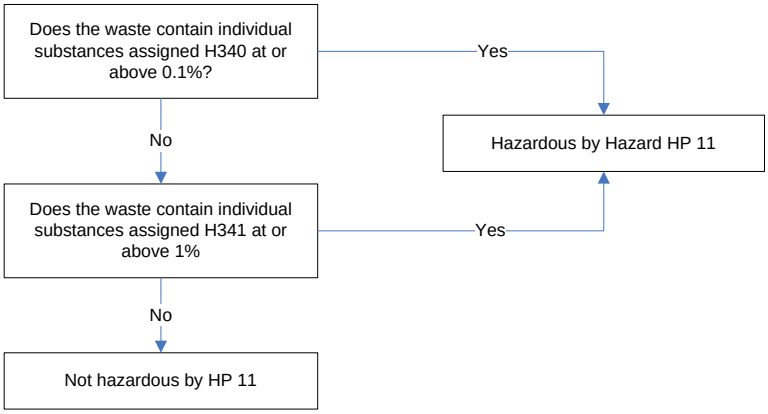
Table C1.11 Hazard Class and Category Code(s) and Hazard statement Code(s) for waste constituents and the corresponding concentration limits for the classification of wastes as hazardous by HP 11

Hazard Class and Category Code(s)	***Hazard statement Code(s)***	***Description***	***Concentration limit***
Muta. 1A	H340	*May cause genetic defects*	0.1%
Muta. 1B			
Muta. 2	H341	*Suspected of causing genetic defects*	1.0%

C11.4 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



C11.5 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].

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

Appendix C:

C12 Assessment of Hazards HP 12: Produces Toxic Gases in Contact with Water, Air or Acid

(entire chapter replaced)

C12.1 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*"

C12.2 Limiting concentration

A waste isn't assessed for HP 12 with reference to limiting concentrations of substances. The WFD however 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

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

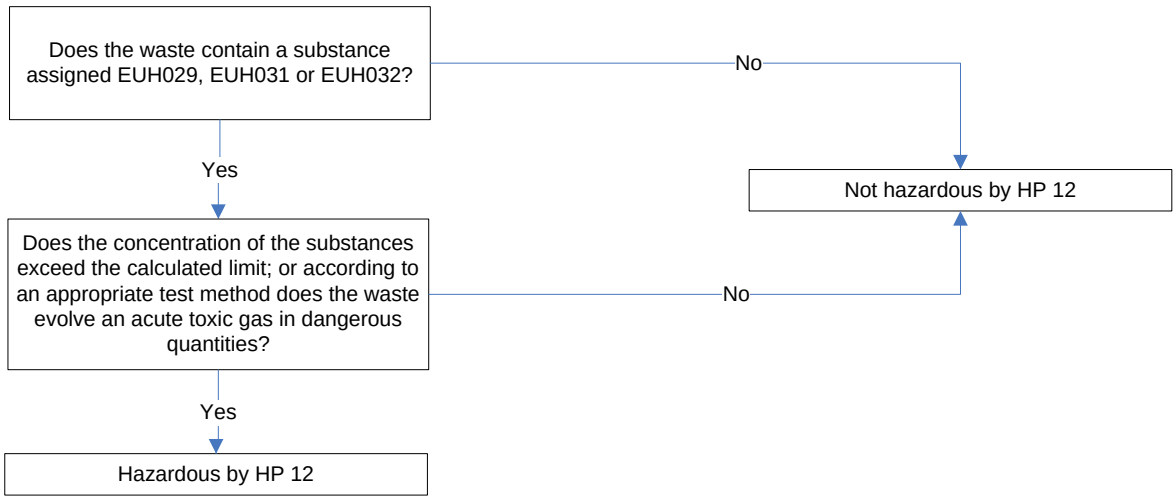
C12.3 Cut-off values

No cut-off values apply to this assessment.

C12.4 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



C12.5 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, chlorine, nitrogen dioxide, ammonia and hydrogen cyanide.

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

Substance name	Risk Phrases	Equation	Threshold concentration 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	Risk 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	EUH032 R15/29	$AlP + 3H^+ \rightarrow PH_3 + Al^{3+}$ $AlP + 3H_2O \rightarrow PH_3 + Al(OH)_3$	0.3 0.3
Calcium phosphide	R15/29	$Ca_3P_2 + 6H_2O \rightarrow 2PH_3 + 3Ca(OH)_2$	0.4
Magnesium phosphide	R15/29	$Mg_3P_2 + 6H_2O \rightarrow 2PH_3 + 3Mg(OH)_2$	0.3
Trizinc diphosphide	R15/29	$Zn_3P_2 + 6H_2O \rightarrow 2PH_3 + 3Zn(OH)_2$	0.6

Notes:

[1] Rounded to one decimal place

[2] Based on 29.3 g sodium hypochlorite per 100 ml (max solubility)

C12.7 Test Methods

There are however 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.

Appendix C:

C13 Assessment of Hazards HP 13: Sensitising

(entire chapter replaced)

C13.1 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*"

C13.2 Limiting concentration

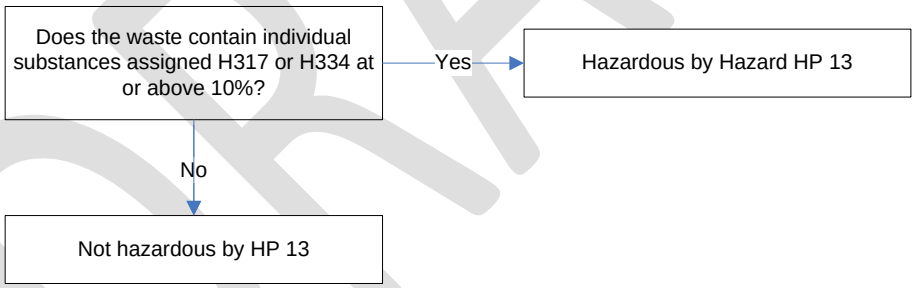
The WFD states that:

> 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.

C13.3 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



C13.4 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].

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

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Appendix C:

C14 Assessment of Hazard HP 14: Ecotoxic

(entire chapter replaced)

The European Commission is considering what criteria will apply to HP 14 Ecotoxic from 1st June 2015.

We will include this information once we are informed of the decision.

Should this information not become available until after the 1st June 2015, the criteria set out in Technical Guidance WM2 for H14 Ecotoxic will continue to apply.

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Appendix C:

C15 Assessment of Hazard HP 15: (entire chapter replaced)

C15.1 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*"

C15.2 Limiting concentration

A waste isn't assessed for HP 15 with reference to limiting concentrations of substances. The WFD however 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

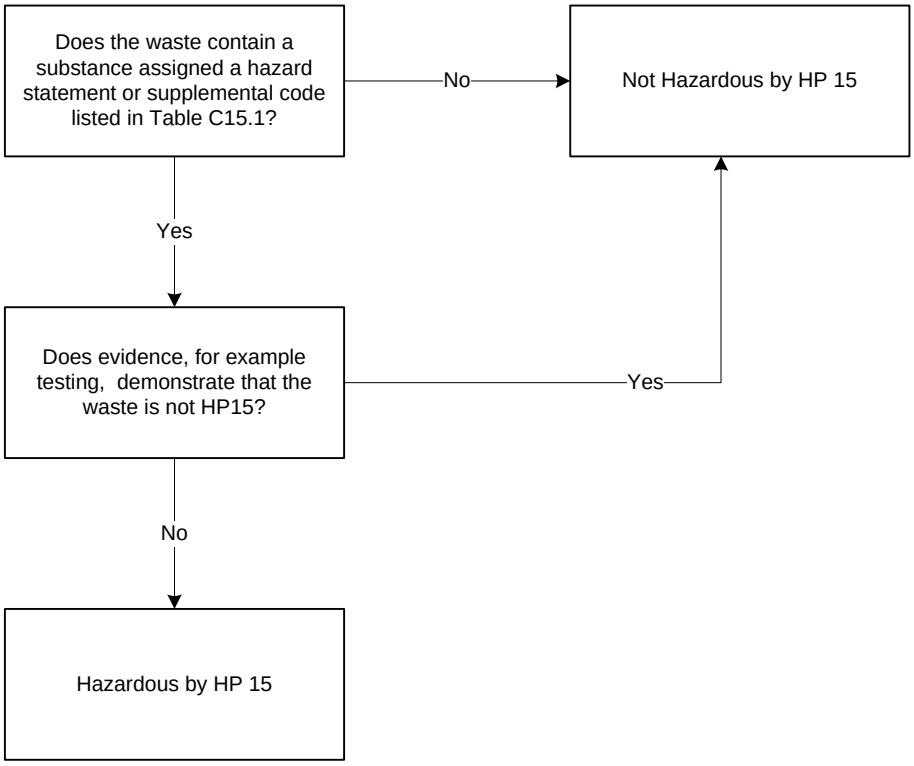
Hazard Statement(s) / Supplemental Hazard(s)	
May mass explode in fire	*H205*
Explosive when dry	*EUH001*
May form explosive peroxides	*EUH019*
Risk of explosion if heated under confinement	*EUH044*

.

C15.3 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



C15.4 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:

(new chapter added)

C16.1 Definition

Annex III of the Waste Framework Directive does not assign a hazardous property to persistent organic pollutants (POPs):

C16.2 Limiting concentration

The List of Waste however 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.

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 (EC) No 850/2004.

These thresholds are reproduced in Table C16.1. Users should note that any amendments to the thresholds listed in annex IV of (EC) 850/2004 take precedence over threshold values listed here.

C16.3 Cut-off values

No cut-off values apply to this assessment.

Table C16.1 Concentration limits for the classification of wastes as hazardous due to the presence of persistant organic pollutents

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	PCDD	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:

$$\Sigma[C_i \times TEF_i] > 15\ \mu g/kg$$

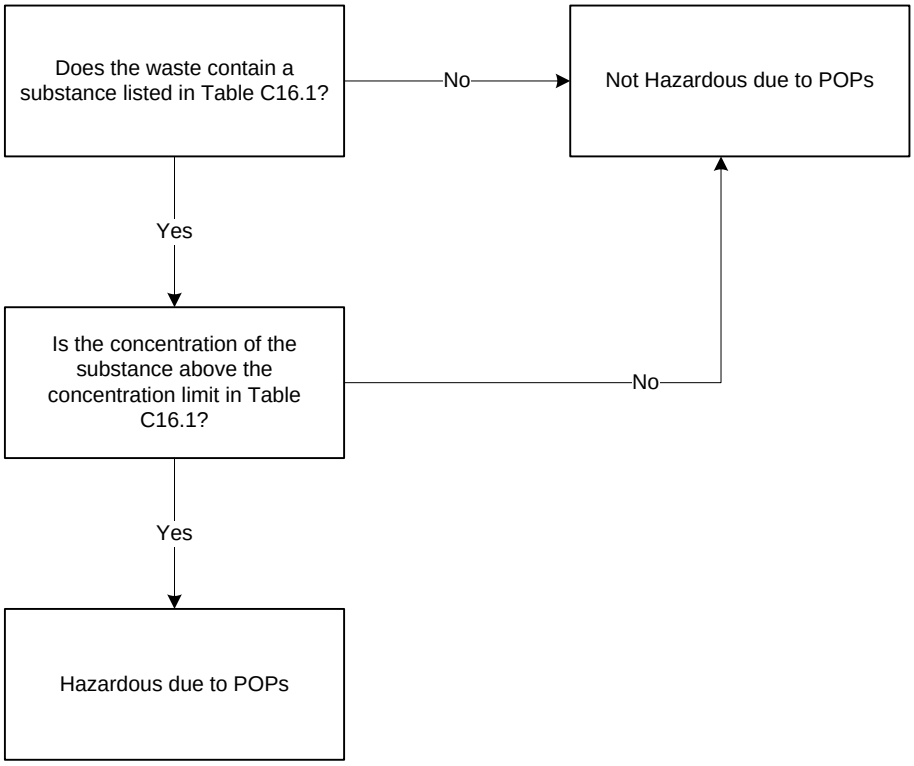
Where

- 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.

C16.4 Decision Tree

Figure C16.1 sets out the assessment process for persistent organic pollutants.

Figure C16.1 | Decision tree for the assessment of Hazard HP 15



C16.5. 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.

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DRAFT

Waste Sampling

Appendix D

A Supplement to : Waste Classification
Guidance on the classification and assessment of waste
(1st edition 2015)

Technical Guidance WM3

SEPA
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NIEA
www.ni-environment.gov.uk
Northern Ireland Environment Agency

Cyfoeth Naturiol Cymru
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Publishing Organisations

Natural Resources Wales / Cyfoeth Naturiol Cymru,
Tŷ Cambria,
29 Newport Road,
Cardiff,
CF24 0TP.

Tel: 0300 065 3000

www.naturalresourceswales.gov.uk

Scottish Environment Protection Agency (SEPA),
SEPA Corporate Office,
Erskine Court,
Castle Business Park,
STIRLING,
FK9 4TR.

Tel: 01786 457700
Fax: 01786 446885

www.sepa.org.uk

Northern Ireland Environment Agency (NIEA),
Land and Resource Management Unit,
Klondyke Building,
Cromac Avenue,
Gasworks Business Park,
Lower Ormeau Road,
Belfast,
BT7 2JA.

Tel: 028 90549710
Fax: 028 90549310

www.ni-environment.gov.uk

Environment Agency,

Horizon House,
Deanery Road,
Bristol,
BS1 5AH.

Tel 03708 506506

www.environment-agency.gov.uk

Document History

First Edition : January 2015

Adapted from the third edition of technical guidance WM2.

Contents

Introduction

What is this document about?

This document provides guidance on the sampling of waste.

This guidance is a supplement (Appendix D) to our Technical Guidance (WM3) on the classification assessment of waste. It should be used in conjunction with WM3.

Who is it intended for?

This document is intended for anyone involved in the production, management and regulation of waste.

You only need to use this document if your assessment and classification includes, or is reliant on, results obtained from samples.

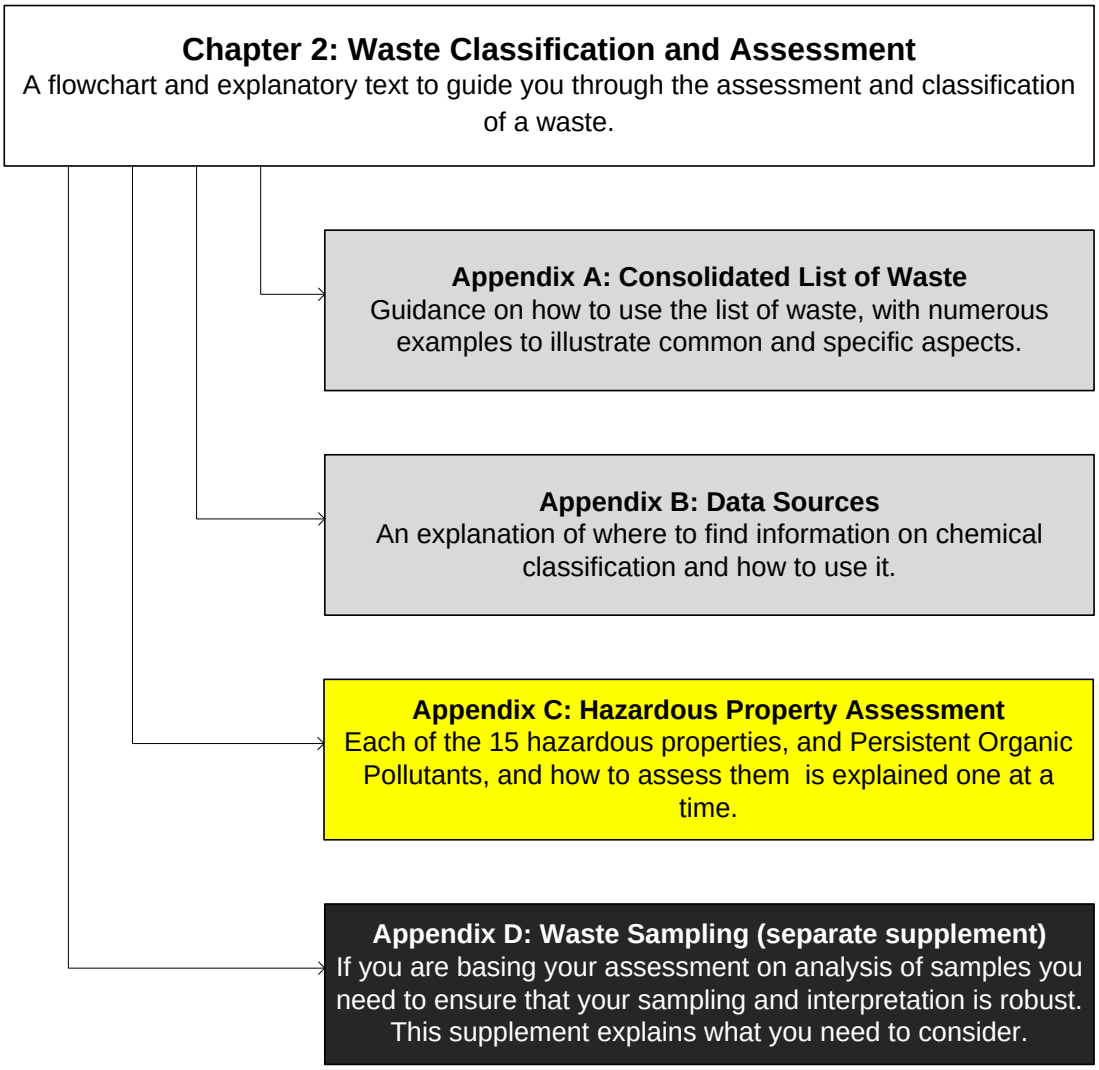
If you are inexperienced in waste sampling, or lack the necessary knowledge of hazardous waste, you should seek advice before using this document.

How is the information presented?

Technical Guidance WM3 is built around chapter 2: Waste Classification and Assessment.

Each of the four Appendices A, B, C and D provide supporting information on a specific aspect of that assessment.

The diagram below illustrates how this document, Appendix D, relates to the other sections:



Appendix D:

Waste Sampling

D1 Background

D1.1 Introduction

To obtain accurate and representative results, and a therefore a reliable assessment, it is essential that the sampling programme is properly planned and conducted.

The key principle is that a sampling plan should be prepared before the first sample is taken. This will help you ensure that relevant factors are considered, and sufficient representative samples are taken, to enable all parties to 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.

D1.2 Legal background

It is 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:

- 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)

We will use these documents as the basis for assessing sampling procedures during our regulatory activities.

Alternative sampling procedures are acceptable if they have 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 the relevant factors.

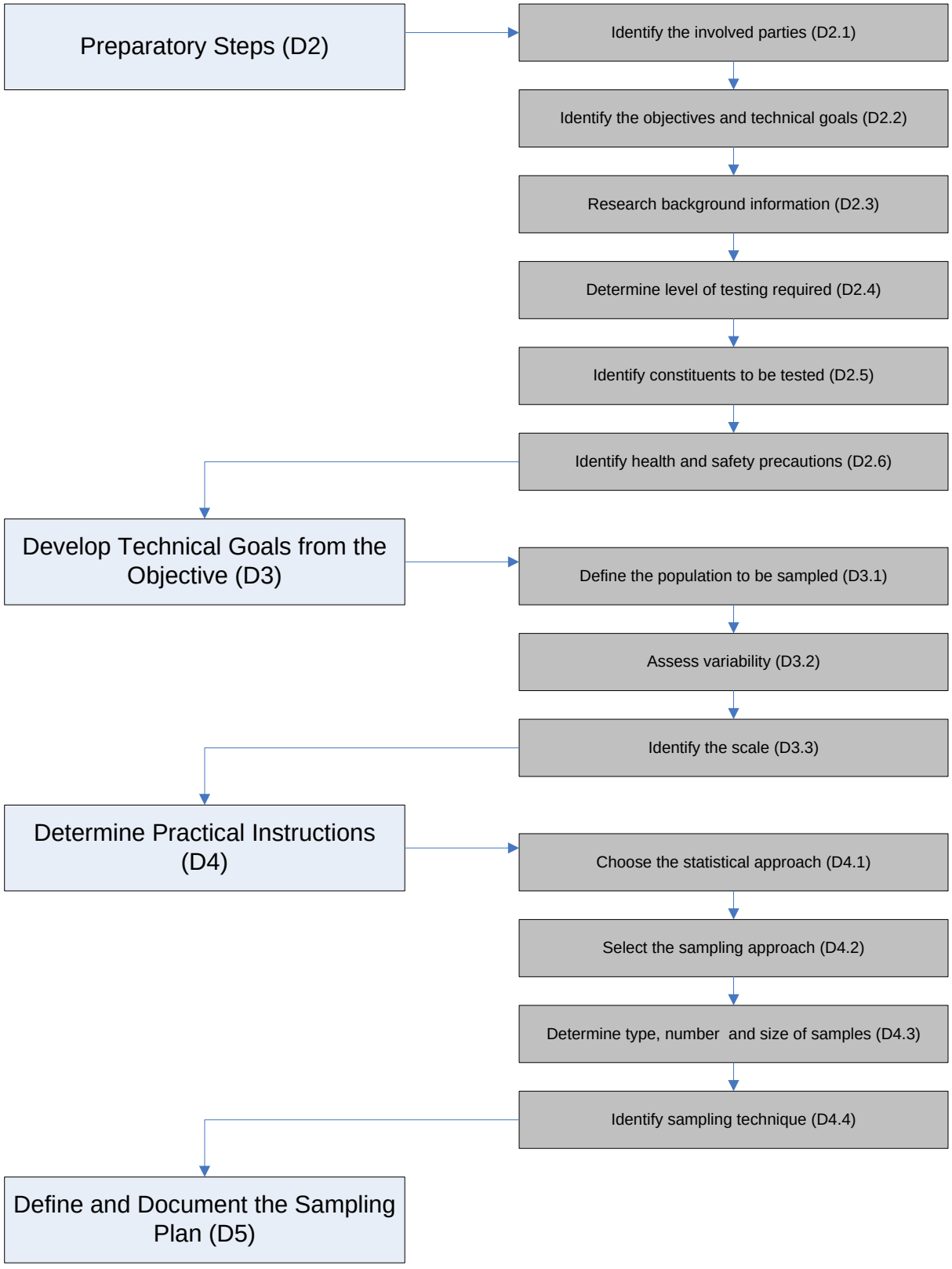
D1.3: The testing programme

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 D1.1 sets out the key steps involved in defining the sampling plan.

Figure D1.1: Defining the sampling plan



D1.4 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.

D2 Preparatory steps

D2.1 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.

D2.2 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

D2.3 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 (e.g. 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, e.g. pH or a metal concentration

An Example of 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.

D2.4 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 following:

- 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
- if contained, what type and size of container; plastic 25 litre drum, silo etc.
- number of containers, and quantity, i.e. 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.

D2.5: Identify constituents to be tested

For waste classification there are three key points to consider here:

- 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
- 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.

Clearly, however, 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.

D2.6: Identify health and safety precautions

A full exploration of this issue is beyond the scope of this document. Advice should always be sought 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

D3 Develop the technical goals from the objectives

D3.1 Define the population to be sampled

The sampling plan should contain a description of the population or subpopulations to be sampled to avoid ambiguity.

D3.1.1 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 (e.g. 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.

D3.1.2 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.

D3.1.3 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.

D3.1.4 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).

D3.1.5 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. We would look for two key factors to underpin this:

- 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.

D3.1.6 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
- each load as 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.

D3.1.7 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.

D3.2 Assess variability

D3.2.1 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

D3.2.2 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 (e.g. mixing a fluid that has separated into phases)

D3.2.3 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.

D3.2.4 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.

D3.2.5 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.

D3.3 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.

D4 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.

D4.1 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 D4.1. These include:

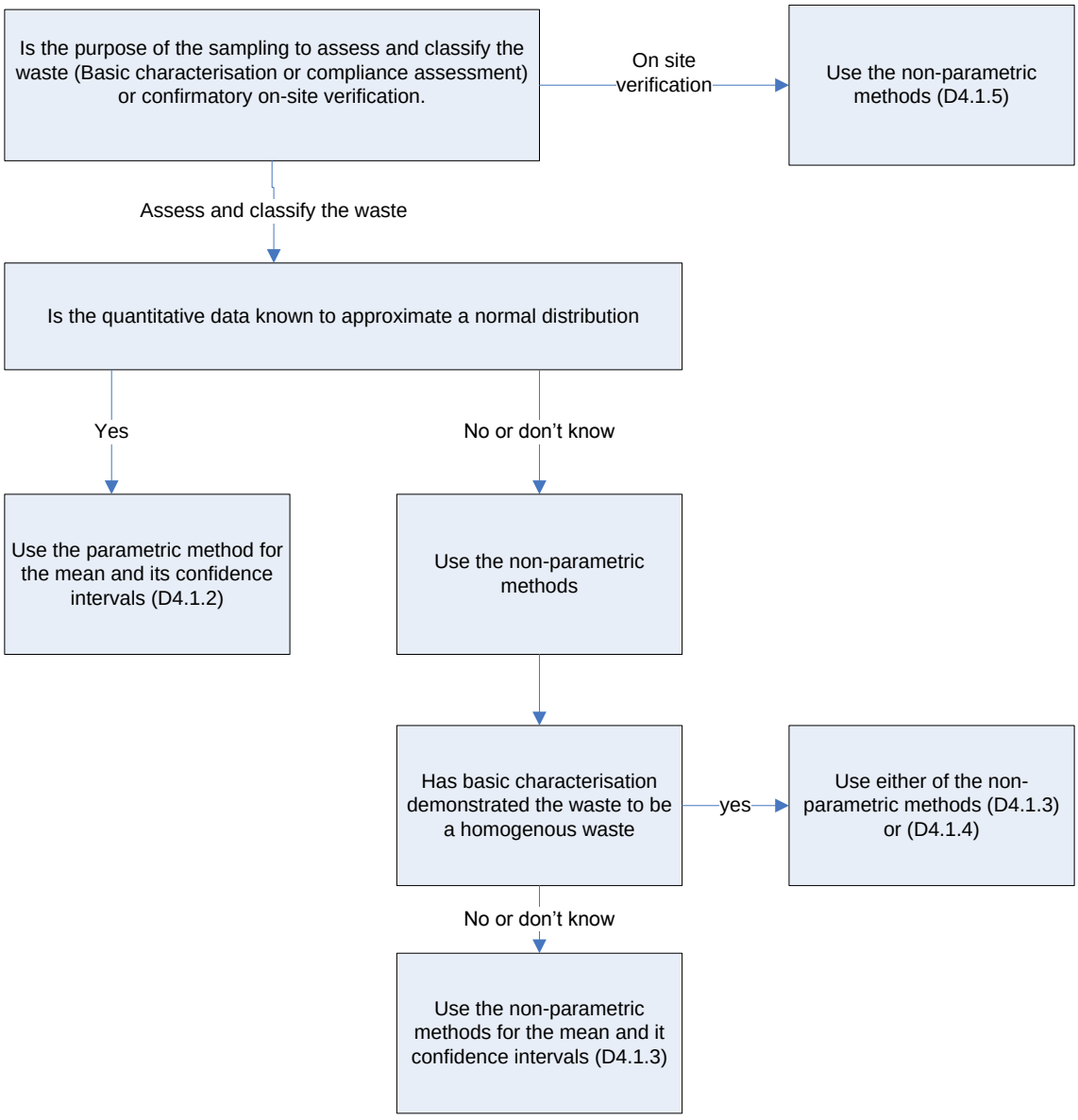
- A parametric method (where the data is normally distributed or approximates a normal distribution), and
- Non-parametric methods (for use where this is unknown or is not the case)

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 threshold for that hazardous property, or
- such a sample could reasonably be taken by another party, for example the regulator.

Figure D4.1: | Statistical approaches



D4.1.2 Parametric method - 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.

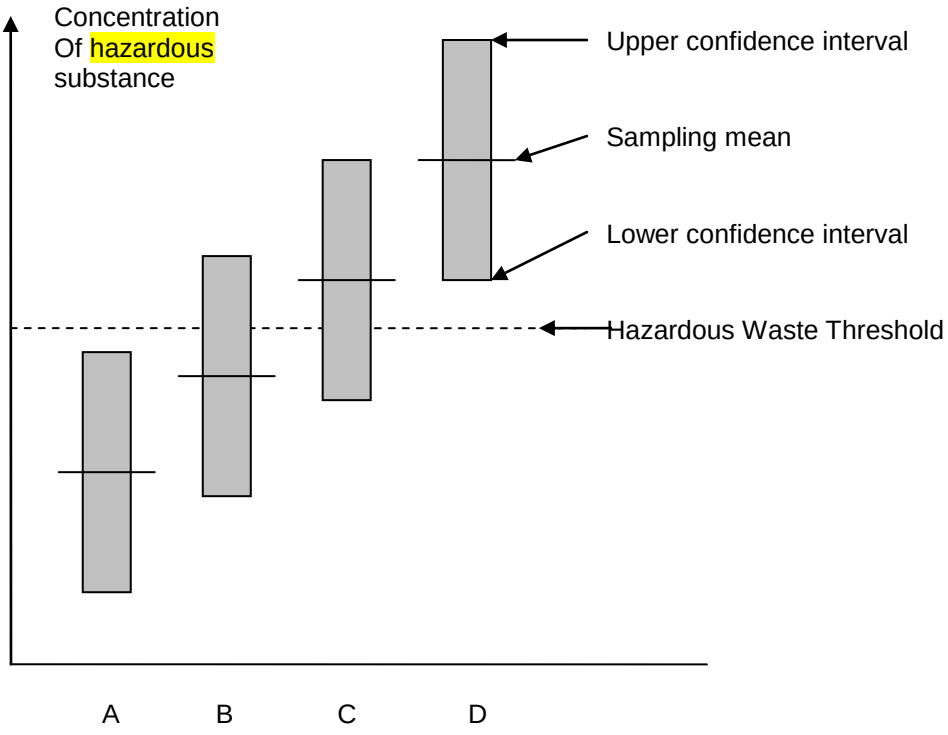
Waste can be heterogeneous so the concentration may vary from one part of the waste to another. The mean concentration in the waste (μ) is therefore the key criteria against which thresholds are considered.

Sampling generates a sampling mean ($\bar{x}$) 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 ($\bar{x}$) does not span the threshold concentration. This would mean that μ could lie either side of the threshold, rendering the assessment inconclusive. Figure D4.2 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 ($\bar{x}$) is below the threshold. We can therefore 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 ($\bar{x}$) is above the threshold. We can therefore 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 D4.2: 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.

For 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 XXXX mg/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 ($\bar{x}$) = 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.

D4.1.3 Non-parametric method - 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:

$X_{50} = X(r)$ where $r = (50/100)(n+1) = (n+1)/2$

For example where n= 11:

$X_{50} = X(r)$ 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 exact 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
- The 9th ranked sample is smallest integer ≥ 0.95(r_2)
- The upper 90% confidence interval is set by the 9th sample
- The 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.

D4.1.4 Further application of the non-parametric approach to compliance assessment

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.

D4.1.5 Application of the non-parametric approach to on-site verification checks

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
- where the number of containers received is ≥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.

D4.1.6 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 risk phrase, 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 risk phrase e.g. chemical A for sample 1, and chemical B for sample 2.

D4.1.7 The 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.

D4.2 Select the sampling approach

D4.2.1 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.

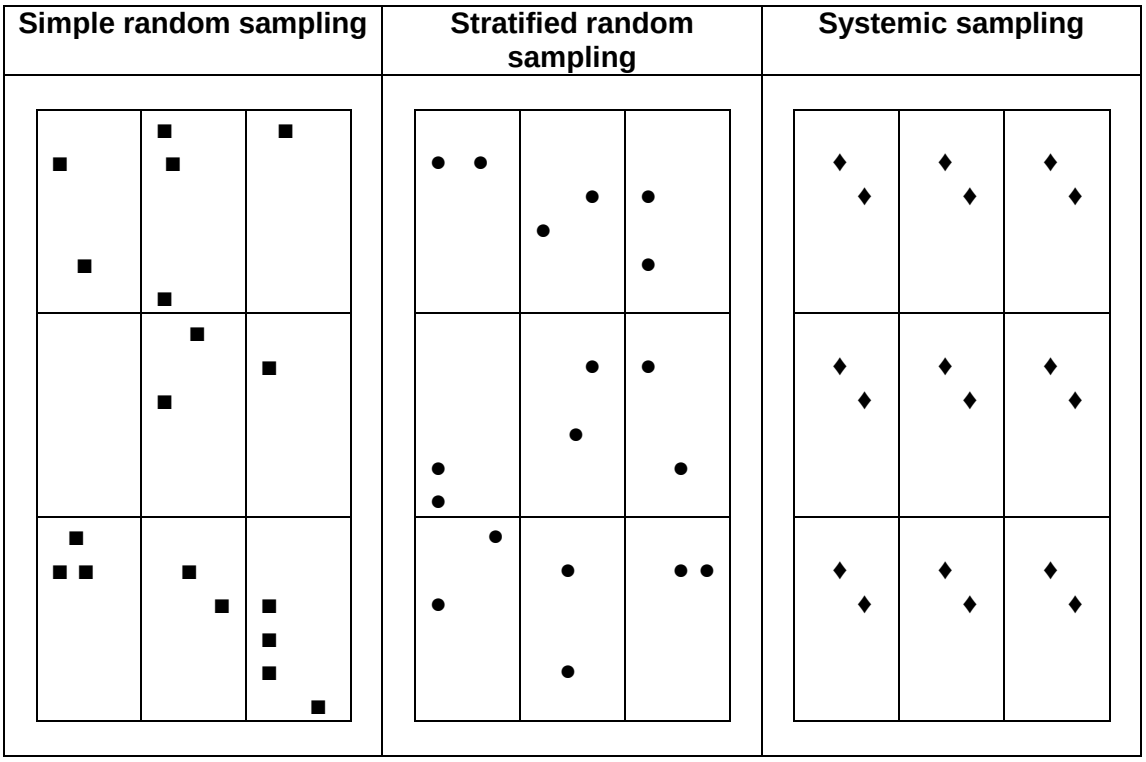
Where judgemental sampling is used the technical arguments for doing so, instead of probabilistic sampling, must be set out in the sampling plan and such sampling should approximate probabilistic sampling as much as possible. Any assumptions relating to un-sampled sub-populations should be supported by evidence to justify this approach.

D4.2.2 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 D4.3 and D4.4:

- **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.

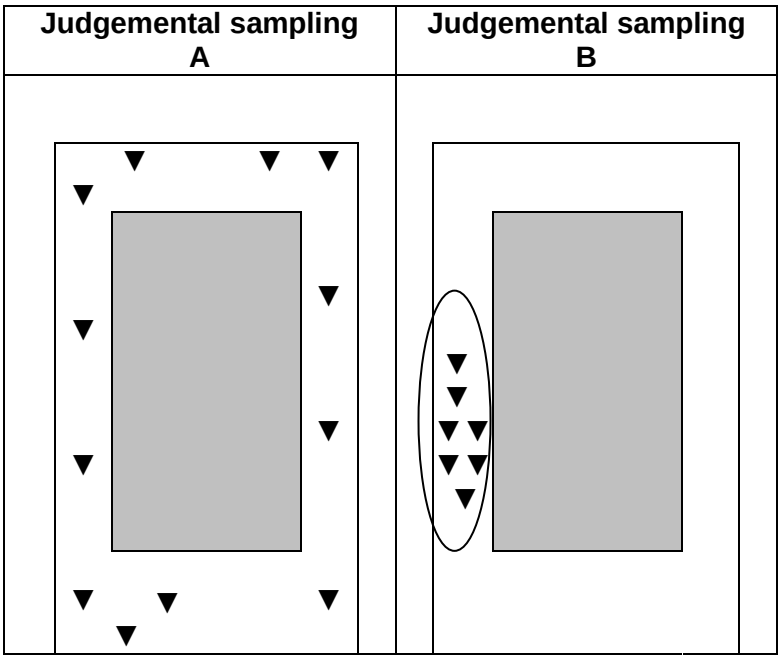
Figure D4.3: | An Illustration of probabilistic sampling patterns



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 D4.4: | 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.

D4.3 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.

D4.3.1 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.

D4.3.2 The use of composite versus individual samples

Using many samples gives you:

- A 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.

D4.3.3 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.

D4.3.4 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.

D4.3.5 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

D4.3.6 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:

$$n = 1.3 \times [\ (u_a s/d)^2(1+u_p^2/2)\ ]$$

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 50^{th} percentile with precision.

D4.3.7 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

D4.3.8 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 $27d^3$

D4.3.9 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 ρ = 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:

$$\text{Mass (Kg)} = 10^{-9} \times \rho \times (3D_{95})^3 = 2.7 \times 10^{-8} \times \rho \times D_{95}^3.$$

Where D_{95} = maximum particle size in **mm.**

D4.3.10 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:

$$\text{Mass (g)} = \frac{1}{6} \pi \times (D_{95})^3 \times \rho \times g \times \frac{(1 - P)}{CV^2 \times P}$$

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.

$$\text{Mass (g)} = \frac{1}{6} \pi \times (D_{95})^3 \times 2.6 \times 0.25 \times \frac{(1 - 0.02)}{0.1^2 \times 0.02} = 1668 \times (D_{95})^3$$

D4.4 Identify sampling techniques

D4.4.1 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.

D4.4.2 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.

D4.4.3 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.

D4.4.4 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 (see example in Figure B.5.3) 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.

D5 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 D.5.1. 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.

D6 Subsequent Steps

D6.1 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.

D6.2 Analytical methods

The approach must be consistent with that set out in Appendix C of technical guidance WM2.

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.

D6.3 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 D5.1: | 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:	