Review of the European List of Waste

Final Report

Executive Summary

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Abbreviations

CLP	Regulation on classification, labelling and packaging of substances and mixtures
CSA	Chemical Safety Assessment
CSR	Chemicals Safety Report
DPD	Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations, Dangerous Preparations Directive
DSD	COUNCIL DIRECTIVE of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances (67/548/EEC) Dangerous Substances Directive
DU	Downstream User of a substance (as such or in a preparation)
ES	Exposure Scenario
eSDS	Extended Safety Data Sheet ((Safety Data Sheet plus Exposure Scenario)
GHS	Globally Harmonised System of classification and labelling of chemicals (substances and preparations)
HWD	Council Directive 91/689/EEC of 12 December 1991 on hazardous waste, Hazardous Waste Directive (91/689/EEC)
LoW	Commission Decision of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste, European list of waste, 2000/532/EC
M/I	Manufacturer or importer of a substance (as such or in a preparation)
OS	Operational Condition
REACH	Registration, Evaluation and Authorisation of Chemicals – Acronym for the new European chemicals legislation
Revised WFD	DIRECTIVE 2008/98/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 November 2008 on waste and repealing certain Directives; (the “revised” Directive 2006/12/EC)
RMM	Risk Management Measures
SDS	Safety Data Sheet
SVHC	Substances of Very High Concern
TOR	The European Commissions' Terms of References for this study
WFD	Waste Framework Directive; Directive 2006/12/EC on Waste (in contrast to the “revised WFD”)

1 Introduction

The European Waste Catalogue (EWC) (Commission Decision 94/3/EC) was to be a “reference nomenclature providing a common terminology throughout the Community with the purpose to improve the efficiency of waste management activities”. It was further developed into the European List of Waste (LoW) by Commission Decision 2000/532/EC[1]. The LoW serves as a common encoding of waste characteristics in a broad variety of purposes like transport of waste, installation permits, decisions about recyclability of the waste or as a basis for waste statistics.

According to Decision 2000/532/EG the LoW should be revised regularly on the basis of new knowledge and, in particular, of research results. The Thematic Strategy on Prevention and Recycling has called for a revision of the system of waste nomenclature with the purpose of simplifying and modernising waste legislation.

At two workshops the TAC discussed experiences with the implementation and application of the LoW. The discussion covered the broad range from amending specific issues within the existing basic structure of the LoW to the need for basic modification of the structure of the LoW.

With this background the objective of this study was to collect and evaluate information about the implementation of the LoW, to develop proposals for its amendment and to analyse its impacts.

Harmonisation of legislation regarding interaction of different legal acts and harmonising the implementation of legislation on European level has been identified as priority objectives of the activities not least because harmonisation includes the potential to simplify legislation.

Information, concerns and suggestions have been collected in two surveys via questionnaires, a stakeholder workshop, two Member States’ workshops and numerous expert workshops and discussions with individual experts.

[1] last amended by Council Decision 2001/573/EC

2 Stocktaking

The conducted surveys showed that the majority of Member States transposed the LoW into national legislation without changes. Modifications are reported by 5 out of the 20 Member States covered by the survey. The national modifications include the introduction of additional waste codes and the modification of existing entries, the adaptation of limit values for hazard criteria, and in one case the modification of the classification procedure.

However, it is important to note that the literal transposition of Decision 2000/532/EC is not sufficient to safeguard a harmonised application of the list. The harmonised application depends on several other factors like the monitoring and enforcement established in the Member States and the provided guidance on LoW-application.

The necessity and importance of guidance for the correct and harmonised application of the LoW is acknowledged by most countries. Several Member States indicated that the publication of a European guidance document would be welcomed.

Guidance documents and tools on the LoW-application are published in at least ten of the Member States that responded to the survey. The guidance documents are published mainly by the environmental authorities. Target groups are the competent authorities themselves, waste generators and waste management companies. The provided documents differ greatly with regard to approach and depth of guidance.

The LoW is established in the EU as the main classification not only for administrative purposes but also for waste statistics. The reason for the frequent use of the LoW for statistics is not necessarily its suitability for statistical purposes but rather the fact that it is well established and is used for administrative purposes anyway.

The answers to the questionnaires indicate that there is a goal conflict between the request to have a less extensive waste list on the one hand and the wish to have specific entries for every waste type. The situation can be characterised as follows:

- Although the LoW with its 839 waste codes is already quite extensive the lack of specific entries in the LoW is considered as one of the main classification problems by several Member States. The frequent use of 99-codes in some countries could be seen as a result of missing entries. However, it could also be interpreted as an inadequate application of the LoW-classification procedure. Altogether, the Member States proposed about 300 additional specific waste codes in their responses to the survey.
- On the other hand, the statistical evaluation has shown that a significant number of waste codes exist that represent only a very small share of the generated waste and/or are used in a few Member States only. This indicates that some waste codes are overly specific and probably dispensable. The potential for the deletion of individual waste codes is further assessed under task 3 of the study on the basis of the collected data.

The main classification problems mentioned by the Member States can be summarised as follows:

- Problems resulting from the structure of the LoW and the classification procedure;
- Problems concerning the classification of hazardous waste and the application of mirror entries;
- Problems resulting from the lack of suitable waste codes;
- Ambiguous classification on account of two or more possible codes;
- Problems resulting from unclear or imprecise definitions.

3 Link between LoW and chemicals legislation

At UN-level, a harmonised set of rules for classification and labelling of substances and mixtures has been developed (Globally Harmonised System GHS). The EU implemented the GHS as a regulation (CLP Regulation) that replaces the Dangerous Substance Directive (DSD) and the Dangerous Preparations Directive (DPD). This requires that the existing link between the LoW and chemicals legislation is updated. Adaptation need relates, inter alia, to the link between H-criteria of the waste legislation and R-phrases which will not exist under the CLP-Regulation any more. The classification according to the CLP-Regulation will comprise the naming of a hazard class and a signal word. Annex V of the DSD is repealed by REACH. REACH refers to Test Method Regulation (EC) 440/2008 instead which has taken over all test methods from the Annex V DSD. Hence, the link from waste legislation - and the H-criteria - to the testing methods has to be updated.

Two scenarios for a revised LoW (in addition to the baseline scenario 1) have been developed and analysed regarding their potential impacts.

Scenario 2 comprises the following elements (references to the chapters in the full report are provided in the format "volume/chapter/page")

- The system of H-criteria for the decision whether a waste is a hazardous waste is maintained. Article 2 of the LoW is updated with the most closely corresponding hazard classes and hazard categories of CLP (2/.6.2.1/24).
- For H-criteria that are mentioned in Annex III of the revised WFD for which no appropriate correspondence exist in the CLP Regulation (H9, H12, H15) specific provisions are included in the LoW (see below) (2/.6.2.1/24).
- Note 1 of Annex III of the revised WFD is amended as follows in order to link the hazardous properties with the CLP regulation: "Attribution of the hazardous properties H1 – H8, H10, H11, H13 and H14 is made on the basis of the criteria laid down by Article 3 of the CLP regulation" (2/.6.2.1/24).
- The term "preparation" is replaced by the term "mixture" in the revised WFD and the LoW and the term "dangerous" by "hazardous" (2/.6.2.1/24).
- Criterion H9 of the revised Waste Framework Directive is not further defined in chemicals legislation. A review of the criterion as shown below is proposed (2/6.2.2.1/25):

Table 1: Summary - Criterion H9

Topic	Existing Legislation	Proposal for a revised text / approach	Comments
Definition	Substances containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms.	Wastes containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms]	The definition must be accompanied by clear definition of terms in order to achieve harmonised implementation
Definitions for terms	Not available	• "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 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" - This includes Animals, but not plants.	
List of origins and waste types	Not available	Lists to be included in a EU guidance document	

- Criterion H12 of the revised Waste Framework Directive needed to be operationalised by developing an appropriate limit value (2/6.2.2.2/35). The table below summarises the proposed amendments:

Table 2: Summary - Criterion H12

Topic	Existing Legislation	Proposal for a revised text / approach	Comments
limit value	Not available	1 l of gas per kg of waste and hour	The value is set as a convention.
List of most relevant gases + hazard statements of CLP	Not available	Include list in guidance document	
Non exhaustive list of relevant substances	Not available	Include list in guidance document	

- Criterion H15 of the revised Waste Framework Directive (the former criterion H13) is not further defined in chemicals legislation. Approaches for the classification and threshold values have been elaborated as shown below ((2/6.2.2.3/44).

Table 3: Summary H15

Topic	Existing Legislation	Proposal for a revised text
Definition	Substances and preparations capable by any means, after disposal, of yielding another substance, e.g. a leachate, which possesses any of the characteristics listed above.	Waste capable of yielding a substance at disposal which exhibits one or more of the hazards defined in Annex III of Directive 2008/98/EC
Concentration limits	Not available at European level	maximum concentration values for hazardous waste on non-hazardous landfills according to section 2.3 "Criteria for hazardous waste acceptable at landfills for non-hazardous waste pursuant to Article 6(c)(iii)" in the Annex to Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC (2003/33/EC)
Test methods	No available	Reference to Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC (2003/33/EC) and the applied leaching test methods as provided in section 3. SAMPLING AND TEST METHODS

- Criterion H14 of the revised Waste Framework Directive has been further operationalised with a focus on biotests (2/6.2.2.4/53).

Table 1: Summary criterion H14

Topic	Existing Legislation	Proposal for a revised text / approach	Comments
Definition	"substances and preparations which present or may present immediate or delayed risks for one or more sectors of the environment"	"waste which presents or may present immediate or delayed danger to the environment "	The term "risk" does not seem to be appropriate because the property H14 is seen as an intrinsic property.
Link of definition with chemicals legislation	Reference to DSD/DPD	Update of the link is part of the general update from DSD/DPD to CLP	
Test methods	No method for biotests available	Fixed test battery for biotest	
Concentration limits / limit values	No value for biotests available	National approaches with evaluation period	

For biotests in the frame of criterion H14 the following test battery is proposed to be taken up in the LoW:

Table 4: Proposal for a test battery

Test system	Reference	Test organism	Endpoint	Toxicity criteria
Aquatic tests for waste eluate testing				
Determination of the inhibition of the mobility of *Daphnia magna* Straus (Cladocera, Crustacea) - Acute toxicity test	DIN EN ISO 6341	Daphnia magna	Immobilisation	10%
Freshwater algal growth inhibition test with *Scenedesmus subspicatus* and *Pseudokirchneriella subcapitata*	DIN EN ISO 8692	*Scenedesmus subspicatus* or *Pseu-dokirchneriella subcapitata*	Growth	20%
Determination of the genotoxicity of water and waste water using the umu test	ISO 13829	*Salmonella*	Gen induction	Dmin ≥ 2
Terrestrial tests for solid waste testing				
Soil quality - Determination of the effects of pollutants on soil flora -Part 2: Effects of chemicals on the emergence and growth of higher plants	ISO 11269-2	*Brassica napus* (only one spe-cies)	Growth	30%
Soil quality - Avoidance test for determin-ing the quality of soils and effects of chemicals on behaviour -- Part 1: Test with earthworms (*Eisenia fetida* and *Eis-enia andrei)*	ISO 17512-1 (2007a)	*Eisenia fetida/ Eisenia andrei*	Behaviour	20%
Solid contact test with *Arthrobacter globi-formis*	DIN 38412-48 (2002) ISO 10871 (2008)	*Arthrobacter globiformis*	Dehydrogenase activity	20%

Remarks: For the Extended Limit Test System only one plant species shall be tested. The umu test is the only genotoxicity test suggested for the Extended Limit Test System, because of limited experience with other genotoxic test systems. It might be replaced after additional scientific investigations.

Presently, no sufficiently broad data basis is available to determine limit values for biotesting according to H14. It is proposed to include the test battery including the scientifically derived and test specific toxicity criteria as binding test method in the revised LoW (no link to chemicals legislation is possible at this point). The revised LoW shall require that Member States fix own limit values for the hazard classification based on biotests or alternatively apply a yes/no decision (waste shows effect in limit tests/shows no effect in limit tests). The results in the Member States shall be communicated to the European Commission. A review of these provisions should be done after three years.

- Article 2 of the LoW refers to the DSD/DPD. It is proposed to maintain the principal approach of Article 2 of the LoW and to update it with the most closely corresponding hazard statement of the CLP Regulation. The update generic concentration limits of the CLP Regarding are taken into account. The additivity principle is considered by a specific column in the revised Article 2 (2/6.2.3/67).

Table 2: Generic concentration limits – proposal for a revised Article 2 of the LoW

H-criterion	Specification	Additivity
H3 Flammable	flash point ≤ 55°C,	
H6 Toxic	substances classified as acute tox. Cat.1 or acute tox. Cat.2 or STOT single 1 (T+) at a concentration ≥ 0,1 %,	Yes
	substances classified as acute tox. Cat.3 or STOT single 1 (T) or STOT rep. Cat.1 at a concentration ≥3%,	
H5 Harmful	substances classified as acute tox. Cat. 4 or STOT rep. 2 at a concentration ≥ 25 % (),	Yes (incl. H7)
H8 Corrosive	substances classified as skin corr. Cat.1A at a concentration ≥ 1%,	Yes (incl. H4)
	corrosive substances classified as skin corr. 1B at a concentration ≥ 5%,	
H4 Irritant	substances classified as eye damaging cat.1 at a concentration ≥ 3%,	Yes (incl. H8)
	substances classified as eye irrit. Cat. 2 or skin irrit. Cat.2 or STOT single Cat.3 at a concentration ≥ 10%,	
H7 Carcino-genic	substances classified as carcinogenic cat. 1A or 1B at a concentration ≥ 0,1 %,	
	substances classified as carcinogenic cat. 2 at a concentration ≥ 1 %,	
H10 Reprotoxic	substances classified as reprotoxic cat. 1A or 1B at a concentration ≥ 0,3%	
	substances classified as reprotoxic cat. 2 at a concentration ≥ 3%	
H11 Mutagenic	substances classified as mutagenic cat. 1B at a concentration ≥ 0,1 %,	
	substances classified as mutagenic cat. 2 or STOT single cat. 2 at a concentration ≥ 1 %,	
H13 Sensitising	substances classified as Resp. sens. Cat.1 or Skin. sens Cat.1 at a concentration ≥ 1 %,	

- In order to take account of specific limit values for substances with a specific hazard profile it is proposed to amend Note 2 of Annex III of the revised WFD by adding the text: "Where relevant the limit values according to Annex VI of the CLP Regulation and the European Classification and Labelling Inventory shall apply" (2/6.2.4/69).
- For a number of substances chemicals legislation does not reflect the situation of waste management appropriately. Thus waste specific concentration limits for selected substances are introduced as a new instrument in the LoW (2/6.2.5/75):

Table 3: Proposed limit values specific for waste management purposes

Substance	Hazardous waste if concentration of the substance is above...
PCDD/F	10 µg/kg
TOXAPHENE	2.5 mg/kg
MIREX	25 mg/kg
ENDRIN	2.5 mg/kg
DIELDRIN	2.5 mg/kg
DDT	2.5 mg/kg
CHLORDANE	2.5 mg/kg
ALDRIN	25 mg/kg

- In a number of cases experience from the application of the LoW shows that that not both entries of a mirror entry pair are used or necessary. In order to minimise the efforts for the characterisation of waste it is proposed to minimise the number of mirror entries as far as possible. Therefore the entries of the LoW: 10 03 22, 10 03 24, 10 03 26, 10 03 28, 10 09 16, 10 10 14, 10 10 16, 11 01 12, 19 13 04 are deleted. As a consequence the corresponding hazardous mirror entries become absolute entries.
  The possibility for the waste producer to opt out (to provide evidence that his specific waste is non-hazardous) should be included as an explicit provision in the revised LoW (2/6.2.6.1/85).
- The analytical efforts for the characterisation of waste shall be minimised where possible without lowering the level of environmental protection. Simplified analytic approaches for the characterisation of waste containing hazardous metal compounds bear a great potential to achieve this effect. It is to be stated that no sufficient scientific basis is available yet to apply such an approach on European level. The potential for a reduction of analytic efforts advices to initiate further research. As a first step agreements for detailed approaches might be taken as conventions based on expert judgement in order to avoid too long delay and to cope with the great importance of such an approach (2/6.2.6.2.1/90).
- The characterisation of tar containing waste is usually done via analysis of reference substances (here B(a)P). It is to be stated that presently no sufficient scientific basis is available to set limit values based on scientific ground on European level. Support for the finding of a convention on European level in form of quantified impacts (amount of affected waste depending on the limit value) should be developed based on comparable analytical results from different Member States. If the research reveals that significant variations in the composition of the wastes occur it is proposed to take no action on European level but on national level where necessary (2/6.2.6.2.3/94).

- A generic characterisation strategy has been developed to be included in an Annex of the revised LoW in order to ensure harmonised characterisation process and minimisation of efforts for a reliable characterisation of waste (2/6.2.6.3/101).

Scenario 2a keeps the generic concentration limits as they are presently in Article 2 of the LoW while scenario 2 changes 6 of 24 values (2/6.2.7/109).

Scenario 3 replaces the existing system of H-criteria of the revised Waste Framework Directive by a direct link to the CLP Regulation. Wastes are treated in this scenario like mixtures in chemicals legislation (2/6.3/111).

The table below provides an overview of scenarios 2, 2a and 3 and the related impacts (2/7/112).

Table 4: Grouping of measures in the scenarios - overview

	Scenario 2	Scenario 2a	Scenario 3
Basic principle of the link between LoW and CLP	H-criteria		Waste = mixture
Detailing of H-criteria	Yes		Specific provisions only for H9, H12, H15
Generic concentration limits	Part of LoW in line with Annex of CLP Regulation	Part of LoW; partly in line with Annex of CLP regulation, partly proprietary limit values	Link to Annex CLP
Specific concentration limits	Annex CLP		
Waste specific concentration limits	For POP containing waste, for H9, H12, H15		
Guidance on characterisation	Yes; Including waste specific approaches		Yes; Guidance for characterisation of mixtures in chemicals legislation

The table below summarises the outcome of the assessment of the scenarios 2, 2a and 3 compared to a baseline scenario of an LoW without changes.

Table 5: Assessment of scenarios 2, 2a and 3 relative to the baseline scenario ("+" = positive impact, "-" = negative impact, "0" = levelled impact)

<table>
<tr><th colspan="2">Objective / impact category</th><th>Scenario 2</th><th>Scenario 2a</th><th>Scenario 3</th></tr>
<tr><td colspan="2">Harmonisation of legislation (Waste legislation and chemicals legislation)</td><td>+</td><td>+/-</td><td>++</td></tr>
<tr><td colspan="2">Harmonisation of classification practice in Member States</td><td colspan="3">+</td></tr>
<tr><td rowspan="2">Administrative and financial efforts</td><td>change to new system in general</td><td>-</td><td>0</td><td>- -</td></tr>
<tr><td>Change to revised criteria H9, H12 and H15</td><td colspan="3">+</td></tr>
<tr><td colspan="2">operating costs and conduct of business; trade and investment flows</td><td>-/0</td><td>0</td><td>-</td></tr>
<tr><td rowspan="2">Competitiveness</td><td>Distortion of competitiveness (supra-national)</td><td colspan="3">+</td></tr>
<tr><td>Distortion of competitiveness (national)</td><td>0/(+)</td><td>0</td><td>0/(+)</td></tr>
<tr><td rowspan="4">Environment</td><td>Basic system</td><td colspan="3">0</td></tr>
<tr><td>Differences of classifications</td><td colspan="3">/*</td></tr>
<tr><td>Portion of waste under stronger control regime</td><td>+</td><td>-</td><td>+</td></tr>
<tr><td>Consideration of new knowledge about classification of substances</td><td>+</td><td>-</td><td>+</td></tr>
</table>

* The environmental impact from potential differences of classification of wastes can not be assessed in detail.

Summarising it can be stated that scenario 3 achieves the best harmonisation of legislations. This is, however, connected with additional efforts for the characterisation of waste and, with this, additional costs. At the same time no environmental benefits could be identified which would balance these additional efforts.

Simplification of the classification process in scenario 2 (compared to chemicals legislations' classification in scenario 3) is especially relevant for SME.

The impact on administrative efforts for public authorities would be lowest in scenario 2a. This scenario shows at the same time the lowest environmental benefit of the three scenarios.

4 Structure of the LoW and review of individual entries

The present version of the LoW is structured in a heterogeneous way. With an overall number of 20 sections the header of section 1 to 12 and 17 to 19 refers to industry sectors and/or processes, sections 13 to 15 are referring to materials (e.g. oil containing wastes) and section 16, which is largely material based as well, is reserved for wastes not otherwise mentioned. Section 20 covers municipal wastes and similar commercial, industrial and institutional waste.

Presently the European list of waste comprises 839 waste codes. 405 codes are codes for hazardous wastes. The coding of the waste keys is done via a six digit code (XX YY ZZ).

XX main section 1 to 20, provides general information about the group of wastes (e.g. group with a same origin),
YY subsection, provides more detailed information about the subgroup of wastes,
ZZ consecutive number for each waste type.

The entries show a wide variety of ways to describe the wastes and different descriptors are applied. The entries include:

- 66 entries providing exclusively information about the origin,
- 260 waste codes that give information about the process where the waste has been generated,
- 245 waste codes that give information about the physical state of the waste and
- 514 waste codes that give information about the material or substance present in the waste as main component.

In two surveys stakeholders have been asked, inter alia, which are according to their experience the most serious classification problems resulting from the application of the LoW. The answers can be grouped as follows:

a) Problems resulting from the structure of the LoW and the classification procedure;
b) Problems concerning the classification of hazardous waste and the application of mirror entries;
c) Problems resulting from the lack of suitable waste codes;
d) Ambiguous classification on account of two or more possible codes;
e) Problems resulting from unclear or imprecise definitions.

Issues a) and c) to e) touch the entries and the structure of the LoW. Issue b) is discussed in volume 2 of this report. In order to improve the functioning of the LoW and to solve issues related to the structure of the LoW a concept has been outlined according to the terms of references to this project by which the identifier "waste origin" is detached from the six digit waste code. The remaining content of the code has been restructured accordingly.

Two scenarios have been analysed relative to a baseline scenario, which describe the situation with the present structure of the LoW:

In scenario 1 wastes are described by a number of identifiers (**Independent Descriptors ID**) which can be assigned individually to a waste (3/4.2/16). The following descriptors are applied in the ID system developed by the Flemish OVAM for the description of wastes:

- “origin” (process/activity where the waste is generated),
- “nature” (e.g. fixer solution, fireworks, catalysts),
- “main component” (e.g.. chlorine, mercury, aluminium, plastic),
- “polluting component” (e.g. wood hardening agent, coating, pigment, PCDD/F),
- “physical state” (e.g. gas, liquid, sludge),
- “hazard” (H-criteria according to the Hazardous Waste Directive),
- “collection and removal method” (e.g. Removal upon request, Collection points, Recycling centres),
- “treatment / processing” (e.g. recycling),

The waste code results from the codes of the individual descriptors as illustrated in the figure below.

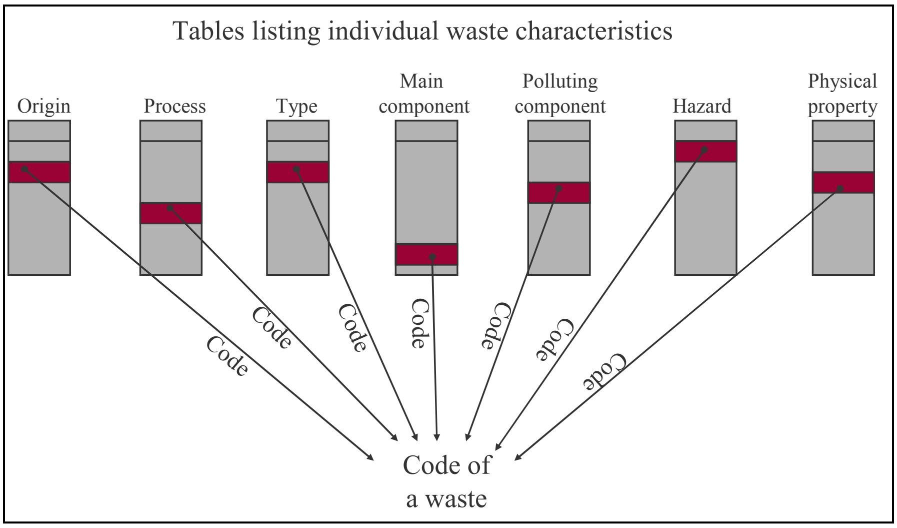

Figure 1: Illustration of the generation of waste codes in the ID-system

The individual descriptors could go into great detail and with this every waste characteristic can be recorded in detail without loss of information. However, there is no compulsory detail level. Where knowledge about a waste is not detailed a description of the waste with fewer elements can be used, if details about the waste are known it is possible to use more details in the encoding process.

Scenario 2 groups a number of individual measures:

- In **Measure 1a** the codes are revised in a way that the origin of the waste is described in an independent part of the code (the digits describing the origin are detached from the remaining code). The origin is described in hierarchical levels. Level 1 is a general differentiation between wastes from commercial processes on the one hand and end-of-service-life-articles on the other hand. Level 2 and three describe the activity and/or process where the waste is generated in a way which is very similar to the approach in the present list[2]. With this large parts of the approach of the present LoW can be maintained.
  The Analysis showed that the NACE system is not designed in a way that it fully fits for the needs of a communication instrument that intends to trigger risk management and other waste management measures (3/4.3.1/22).
- The remaining code of the list (which does not describe the origin of a waste) is grouped in **Measure 1b** by general waste types. As far as possible the basic system of the description of waste properties of the present list is maintained.
  The analysis performed in the course of this study does not support the replacement of the system of the LoW by lists based on Annex VIII and IX of the Basel Convention.
  Measure 1b is to be combined with the possibility of electronic processing of the list (see below) in order to achieve full usability (3/4.3.2/32).
- **Measure 1c** makes the LoW accessible to electronic processing by systemising the information of the entries in a way that individual filtering and sorting of the list depending on the users' preferences and needs can be performed.
  The question whether the LoW is structured by origin of the waste or by material related aspects will become less important because the users can apply individual sortings (3/4.3.3/36).
- **Measure 2** introduces new entries, amends entries and proposes entries for deletion.

[2] Level 1 can be aggregated with level 2 (see vol.3 chapter 4.3.1.2 of this report and figure 7 of volume 3 of this report)

- A code ending with the digits **"98"** is used in the LoW as entry for "other wastes containing dangerous substances" in analogy to the codes ending with "99" for "other non-hazardous waste". "98"-entries shall ensure that hazardous wastes for which no appropriate entry is available in the list are not assigned to non-hazardous entries. At the same time it must be ensured that the control of waste streams is ensured [TOR]. As a result of the analysis it is proposed not to introduce "98"-entries generally in each relevant section of the list but to maintain the present approach where new codes can be introduced in the LoW when evidence is given that for the specific case no appropriate entry is available. A procedure shall be established which makes sure that new developments and proposals from Member States are regularly considered (e.g. TAC sub-working group meeting once per year) (3/4.3.5.1/38).
- Codes ending on the digits **"99"** are used in the LoW as a last resort when no other appropriate entry is available. They read in most cases "wastes not otherwise specified". "99"-codes have been introduced in the list, inter alia, in order to limit the number of entries by providing an entry where wastes can be aggregated that are not mass relevant and/or do not need specific attention because of other reasons. As a consequence only that information about the waste is available that is provided by the heading(s) of the section of the LoW. It has been proven difficult for statistical and other purposes to use codes ending with 99.
  The analysis whether it is possible to delete some or all "99"-entries of the list showed that the available information does not allow to do so. A reduction of waste amounts assigned to "99"-entries can be expected from the other measures proposed in the course of the review of the LoW. A comprehensive solution could be a system of independent descriptors as described in scenario 1. In such an ID-system it is system inherent that the number of wastes, which can not be described in detail by specific codes, is significantly lower than in the present LoW (3/4.3.5.2/41).
- Around 300 new entries have been proposed. A number of them have been in the context of European Waste Directives that require specific entries for proper management and monitoring of wastes. Others cover a broad range of application fields and waste management situations. A comprehensive list of all entries that are proposed for introduction in the LoW has been elaborated and can be found at the end of volume 3 of this report.
  Regarding new and revised entries in the context of European Waste Directives the study proposes for scenario 2 (3/4.3.5.3/42):

WEEE: Revision of the whole section 16 02 and introduction of 31 revised/new entries. The WEEE-related entries in section 20 of the present LoW and the entries for "single use cameras" can be merged with the new entries.

ELV: In the context of the ELV Directive it is proposed to amend one entry of the LoW and to introduce one new entry (new text in red):

16 01 07*	oil filters and fuel filters
16 01 24*	Components which contain hazardous substances

Batteries: Mainly with regard to the proper classification of batteries as hazardous or non-hazardous waste It is proposed to amend the section 16 06 of the LoW as follows:

16	Wastes not otherwise specified in the list
16 06	Batteries and accumulators
16 06 01*	lead batteries
16 06 02*	Ni-Cd batteries
16 06 03*	mercury-containing batteries
16 06 04	discharged alkaline and zinc carbon cells (except 16 06 03 and 16 06 05)
16 06 05*	batteries and accumulators other than those mentioned 16 06 01, 16 06 02 and 16 06 03 containing hazardous substances
16 06 06*	separately collected electrolyte from batteries and accumulators
16 06 07*	mixed batteries and accumulators
16 06 08*	Ni-Mh-batteries
16 06 09*	Lithium batteries

ELS: In the context of End-of-Life-Ships and the dismantling of ships 21 new entries have been proposed.

CCS: A new entry for waste from Carbon Capture and Sequestration is proposed for the LoW in the section on thermal processes: "CO_2 containing waste from CCS activities"

- A number of entries of the list has been proposed by stakeholders for deletion. Additionally the frequency of the use of codes has been analysed in the study. A list of entries which could be subject to deletion has been elaborated on these bases. It is proposed to collect feedback from stakeholders and an expert working group prior to deletion of the entries.

- **Measure 3** introduces the instrument of sub-codes in the LoW (3/4.3.6/50). Sub-codes are codes that are ordered on a level below the usual entries of the list. They can be applied where differentiated descriptions of waste properties are needed for specific purposes but they are not part of the regular LoW. Taking up stakeholders' proposal it is proposed to have the following entries as general entries for WEEE in the LoW:

01* discarded equipment containing or contaminated by PCBs other than those mentioned in 16 02 09

02* discarded equipment containing chlorofluorocarbons, HCFC, HFC

03* discarded equipment containing free asbestos

04* discarded equipment containing hazardous components other than those mentioned in 01 to 03

05 discarded equipment other than those mentioned in 01 to 04

06* hazardous components removed from discarded equipment

07 components removed from discarded equipment other than those mentioned in 06

Other WEEE-related entries as proposed by stakeholders are introduced as sub-entries. It is proposed to publish them as European Standard and to refer to the standard in an Annex to the LoW.
For other waste types sub-codes might be introduced when stakeholders require doing so. This can include sub-codes on national level as long as they do not contradict the European codes.

The table below summarises the main elements of the scenarios.

Table 6: Overview: Differences of the scenarios

	Baseline	Scenario 1	Scenario 2
Structure of the list	Mix of origin- and material based structure	Matrix	More closely to the existing list than scenario 1. Combination of two structuring elements: origin and material
Description of the origin	Yes; unsystematically	Yes; systematically	Yes, not fully systematic
Description of material	Yes; unsystematically	Yes; systematically	Yes, unsystematically
Electronic processing possible	No	Yes	Yes
New entries	New entries are added to the list as new 6-digit codes; update routine is in place	If necessary at all new elements will be inserted in the tables of descriptors. However, it is assumed that this will be a seldom case because of the systematic description of waste properties by independent descriptors. An update routine is intended.	New elements to describe waste properties are added to the list as 4 digit codes. Number of new waste types will be smaller than in baseline scenario. New origins are seen as unlikely. An update routine is intended.
General entries for hazardous waste (e.g. "98" – codes)	Few	Hardly necessary	Few
General entries for non-hazardous waste ("99" – codes)	Yes, in almost every section	Hardly necessary	Yes, in almost every section
Deletion of codes	Yes, deletion of 6-digit codes; update routine in place	Not necessary	Yes, deletion of element to describe origin or of elements to describe waste properties; update routine intended
Sub-codes	No	Not necessary	Yes

The following tables provide an overview of the impacts of the scenarios. A qualitative assessment has been provided where detailed data are missing. Further validation of measure would have been possible in parts with a data basis which is built on the number of waste transport instead of waste amounts and with further information about the individual waste-related permitting of an installation. Anyhow, the development and evaluation of the scenarios has been possible even based on qualitative information with sufficient confidence that the intended effects will be achieved (3/4.3.8/56).

Table 7: Overview analysis of administrative efforts (scale of impacts: -- = much higher efforts, - = higher efforts; ++ much lower efforts, + lower efforts)

		Scenario 1		Scenario 2	
		One-off impacts	Continuous impacts	One-off impacts	Continuous impacts
Waste producer	Small	- -	-	-	+
	Large	- -	0	-	+
Waste management company	Small	/	-	/	+
	Large	- -	0	-	+
Authority	Permitting	- -	0	-	0
	Monitoring and controlling	- -	0	-	+

Scenario 1 shows negative one off impacts in the category “administrative efforts” that result mainly from the change of the system (introduction of waste codes of a new type and new assignment procedures). This is levelled in a medium term perspective when the stakeholders got used to the new system.

Scenario 2 also shows negative one-off impacts but with smaller magnitude than for scenario 1. In the medium term perspective the advantage from reduced number of entries, electronic processing and improved structure of the list leads to reduced efforts for the encoding and decoding of waste properties.

The analysis of environmental impacts has been based on a set of operationalised criteria which have been developed in the light of recent activities (informal TAC working group meetings and studies in the years 2005 and 2006) and put into concrete terms in the TOR for this study (see table below).

Table 8: Overview analysis of environmental impacts (TOR criteria) (scale of impacts: -- = very negative impact, - = negative impact; ++ significant improvement, + improvement)

	Scenario 1	Scenario 2
Does the measure support an easy/simplified classification of wastes with regard to their environmental properties and hazardousness?	++	+
Does the measure support the assessment of environmental impacts arising from the waste in the context of its impacts during its whole life cycle?	+	0
Does the measure support that an efficient waste management is ensured or can be achieved (includes inter alia steering of wastes and the achievement of environmental objectives)?	+	+
Does the measure contribute to transparency and improved monitoring of waste streams for control purposes?	++	+
Does the measure support the verification of the effectiveness of European regulations with regard to specific waste streams?	+	+
Does the measure affect the installation permits with regard to an environmentally sound applicability of wastes in the respective process?	+	0
Does the measure support the functioning as basis for waste statistics regarding, generation, treatment, recovery and final disposal of waste aiming at delivering statistical information for policy makers and industry association (policy performance -closely linked to the efficiency of waste management)?	+	+
Does the measure affect existing and implemented waste management legislation in the Member States?	0	0
Does the measure affect other Community waste legislation, for instance the Waste Shipment Regulation (EC) No 253/93?	0	0
Does the measure provide for flexibility to detail the codes agreed on the EU level by country specific (sub) entries?	0	+

Scenario 1 shows more positive answers to criteria related to environmental impacts than scenario 2 (7:6) and the better assessment per criterion for 4 criteria (one time the assessment of scenario 2 is better).

The work on the review of the LoW revealed the importance of the availability of guidance documents for proper assignment of wastes to codes and congruent encoding and decoding of information. Further development of the availability of guidance documents is seen as important task not least to increase legal certainty with the use of the European List of Waste and the achievement of the environmental objectives of the LoW.

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Review of the European List of Waste

Final Report

Volume I

Introduction
Stocktaking of the implementation of the LoW

November 2008

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Abbreviations

CLP	Regulation on classification, labelling and packaging of substances and mixtures
CSA	Chemical Safety Assessment
CSR	Chemicals Safety Report
DPD	Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations, Dangerous Preparations Directive
DSD	COUNCIL DIRECTIVE of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances (67/548/EEC) Dangerous Substances Directive
DU	Downstream User of a substance (as such or in a preparation)
ES	Exposure Scenario
eSDS	Extended Safety Data Sheet ((Safety Data Sheet plus Exposure Scenario)
GHS	Globally Harmonised System of classification and labelling of chemicals (substances and preparations)
HWD	Council Directive 91/689/EEC of 12 December 1991 on hazardous waste, Hazardous Waste Directive (91/689/EEC)
LoW	Commission Decision of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste, European list of waste, 2000/532/EC
M/I	Manufacturer or importer of a substance (as such or in a preparation)
OS	Operational Condition
REACH	Registration, Evaluation and Authorisation of Chemicals – Acronym for the new European chemicals legislation
Revised WFD	DIRECTIVE 2008/98/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 November 2008 on waste and repealing certain Directives; (the “revised” Directive 2006/12/EC)
RMM	Risk Management Measures
SDS	Safety Data Sheet
SVHC	Substances of Very High Concern
TOR	The European Commissions' Terms of References for this project
WFD	Waste Framework Directive; Directive 2006/12/EC on Waste (in contrast to the “revised WFD”)

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1 Introduction

The European Waste Catalogue (EWC) (Commission Decision 94/3/EC) was to be a "reference nomenclature providing a common terminology throughout the Community with the purpose to improve the efficiency of waste management activities".

The EWC according to Decision 94/3/EC was replaced by the European list of waste (LoW) by Commission Decision 2000/532/EC last amended by Council Decision 2001/573/EC.

It serves as a common encoding of waste characteristics in a broad variety of purposes like transport of waste, installation permits, decisions about recyclability of the waste or as a basis for waste statistics.

According to Decision 2000/532/EG the LoW should be revised regularly on the basis of new knowledge and, in particular, of research results. The Thematic Strategy on Prevention and Recycling has called for a revision of the system of waste nomenclature with the purpose of simplifying and modernising waste legislation.

At two workshops the TAC discussed experiences with the implementation and application of the LoW. The discussion covered the broad range from amending specific issues within the existing basic structure of the LoW to the need for basic modification of the structure of the LoW.

With this background the objective of this study was to collect and evaluate information about the implementation of the LoW, develop proposals for its amendment and analyse its impacts.

Harmonisation of legislation regarding interaction of different legal acts and harmonising the implementation of legislation on European level has been identified as priority objectives of the activities not least because harmonisation leads to simplification of legislation.

In the course of the study a number of important developments of related legislation took place. The Review of the Waste Framework Directive 2006/12/EC was finalised and the European implementation of the Globally Harmonised Sys-tem GHS was developed (CLP Regulation). Both legislations are of high relevance for the provisions of the European List of Waste and the new developments have been taken into account, inter alia, by adapting the baseline scenario of the impact analysis and when the proposals for a new link between chemicals legislation and the European List of Waste have been developed.

The elements of the terms of references (TOR) have been put in a common context with these new developments in order to achieve comprehensive and consistent proposal for a revised European List of Waste.

Information, concerns and suggestions have been collected in two surveys via questionnaires, a stakeholder workshop, two Member States' workshops and numerous expert workshops and discussions with individual experts.

The results of the review are presented in 4 volumes

- Volume 1 summarises information about the implementation of the present List of Waste in the Member States and issues with the efficacy and/or efficiency of the List of Waste.
- Volume 2 is concerned with the link between chemicals legislation and the European List of Waste.
- Volume 3 is about the review of the entries of the European List of Waste and its structure.
- Volume 4 compiles annexed information.
- Volume 5 gives an executive summary of the overall results.

The project team gratefully acknowledges the contributions to this study from stakeholders and Member States via questionnaires, at workshops and individual discussions and especially from the numerous fruitful and constructive discussions at expert workshops and with individual experts.

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2 Stocktaking of the current LoW application

Objectives

The objective of this working step was to compile information on the implementation of the LoW and on the experiences of Member States with its application. The work focused on information that was needed for the work under the other tasks. This includes information on:

- the classification procedures in general;
- the classification of hazardous wastes in particular;
- the rules and testing strategies applied;
- aspects which are relevant for the review of the structure of the LoW.

The respective information is drawn mainly from three sources:

- Questionnaires sent to competent authorities, stakeholders, waste experts, etc (Task 1.1);
- Statistical data (data reported under the WStatR and data from a data request to Member States) (Task 1.2);
- Guidance documents, reports and other literature concerning LoW application in MS (Task 1.3).

The following chapters describe the approach to these tasks and the main results.

Approach

Questionnaire Survey

Survey and questionnaire design

The aim of the questionnaire survey was:

- to collect detailed information on LoW application in Member States;
- to provide input to the development of definitions and rules for the application of the H criteria in task 2;
- to identify aspects to be considered in the revision of the LoW in task 3.

The questionnaire consists of five parts and collects information on:

- the responding institution, association or enterprise (Part 1)
- the transposition and implementation of the LoW in Member States (Part 2);
- the practical application of the LoW (classification problems, needs for revision) (Part 3);
- the application of hazard criteria and mirror entries (Part 4);
- laboratory analyses carried out for waste classification purposes (Part 5).

The complete questionnaire is shown in vol. 4 Annex 1 to this report.

A list of addressees was compiled and agreed upon with the European Commission. The questionnaire was sent to:

- all 27 EU Member States, represented by the Permanent Representations, TAC members, and other competent representatives from Ministries and Environmental Agencies;
- stakeholders (industrial associations, NGOs) and other waste experts.

Questionnaire return

Information from the questionnaires is available on 18 EU Member States:

- From 16 countries the questionnaires were partially or totally completed by official administrative bodies (Ministries, EPAs). From 3 of these countries returns from 2 different bodies were received (Bulgaria, Germany, Spain)
- For two countries (Denmark, France) information is available only from the questionnaires completed by national associations (Denmark: DAKOFA, Waste Denmark; France: FNADE, SYPRED). The respective information is marked accordingly.
- Where available, additional information was drawn from other sources, in particular from the return to a survey carried out by Ökopol in 2005/2006 [Ökopol 2006].

The return from other stakeholders is shown in Table 1. Questionnaires or comments were received from 10 European associations, from 8 national associations and from 8 companies. The input from stakeholders ranges from completed questionnaires to only short remarks on specific aspects.

Table 1: Return of the questionnaire survey from stakeholders

	European associations	National associations	Individual companies	Total
Waste generating industry	5 responses *ECPA, ESTAL, ETRMA, Eurelectric, ACEA*	2 responses *Assocarta, (IT), IVA (DE)*	6 responses *mainly steel and automobile industry*	13 responses
Waste management sector	5 responses *BIR, FEAD, CEMBUREAU Eucopro, WEEE-Forum*	6 responses *FNADE (FR), SYPRED (FR), BDE (DE), Affalddanmark (DK), DAKOFA (DK), Vereniging Afvalbedrijven (NL)*	2 responses *SITA (FR), Sigfito (ES)*	13 responses
Total	10 responses	8 responses	8 responses	26 responses

Analysis of Statistical Information

An analysis of statistical information was carried out in order to provide supporting quantitative information on LoW application in Member States. One source of information was the data collected pursuant to the Waste Statistics Regulation (WStatR)[1] and the review of the corresponding statistical quality reports.

[1] Regulation (EC) No 2150/2002 of the European Parliament and of the Council of 25 November 2002 on waste statistics, OJ L 332, 9.12.2002, p.1, as last amended by Commission Regulation 783/2005/EC, OJ L 31, 25.5.2005, p. 38

The analysis covered the data on waste generation according to Annex I of the regulation and focussed on:

- Waste items (EWC-Stat keys) for which no waste are reported by one or several Member States.
- Waste items which dominate the total amount.
- Waste origins which dominate the total amount.

The table showing the number of entries and the amounts on the basis of EWC-Stat items is shown in Annex 4.3. Furthermore, Annex 4.4 provides a listing of all corresponding LoW-codes for the EWC-Stat items.

It was intended to use the analysis of data on the basis of the WStatR as initial screening for the usage and quantitative relevance of groups of LoW codes, represented by the EWC-STAT waste items. The results of this analysis can briefly be summarized as follows:

- There is no waste item which was not used by a majority of Member states; the item with the lowest number of 14 (of 27 possible) entries was item 48 (EWC-Stat 13, hazardous solidified, stabilised or vitrified wastes), which refers to the two LoW codes 190304* and 190306*[2].
- For hazardous wastes the amounts[3] vary between 0.1 kg/cap*a for hazardous glass wastes (Item 18, EWC-Stat 07.1, one LoW code 101111*) as well as wastes containing PCB (Item 25, EWC-Stat 07.7, 6 LoW codes) and 25.5 kg/cap*a for combustion wastes (Item 45, EWC-Stat 12.4, 51 LoW codes).
- For non-hazardous wastes the lowest value reported is again 0.1 kg/cap*a for spent chemical catalysts (Item 5, EWC-Stat 01.4, three LoW codes 160801, 160803, 160804[4]) and the by far highest value was reported for mineral wastes with 3656 kg/cap*a (Item 42, EWC-Stat 12 (excl. 12.4, 12.6), 72 LoW codes).
- The major sources for waste generation are the manufacturing industry (NACE section D) for hazardous waste and the sectors of mining (NACE section B) and construction (NACE section F) for non-hazardous wastes.

The number of LoW codes mentioned in the above results indicates that, on account of the data aggregation according to the EWC-Stat classification, the analysis allowed only little conclusions with regard to individual LoW codes. Therefore a second analysis was carried out on the basis of individual LoW codes, which is described below. Two major sources of information were used:

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[2] 19 03 04* wastes marked as hazardous, partly stabilised; 19 03 06* wastes marked as hazardous, solidified.

[3] The amounts are aggregates for the EU 27 in relation to the population based on the current state of the data as published by Eurostat at the time of interim report 1.

[4] 160801 spent catalysts containing gold, silver, rhenium, rhodium, palladium, iridium or platinum (except 16 08 07), 160803 spent catalysts containing transition metals or transition metal compounds not otherwise specified, 160804 spent fluid catalytic cracking catalysts (except 16 08 07).

- Data from a data request sent to the Member states, the procedure and requested data of which are described below in more detail.
- Data collected in question 17a) (99-codes used and respective quantities) and question 19 (unused codes) of the survey questionnaire in the context of sub-task 1.1 as already described above (refer to section 0)

The data request was sent to 25 EU Member States, represented by their national Statistical Offices or other representatives of Ministries and Environmental Agencies responsible for data collection.

The Member States were asked to provide data on the national amount of waste and on the number of statistical units that generated the waste on the level of the six-digit LoW codes for the year 2004 or the latest year available, and to provide a specification of the statistical unit applied (e.g. enterprise, kind-of-activity unit, local unit).

The complete distribution and response lists are enclosed in Annex 4.1 and Annex 4.2. The data request was distributed on 14.11.2007 asking for a response until 07.12.2007. Reminders were sent on 17.12.2007 to all addressees that had not responded by that time.

The return on the data request was as follows:

- 19 countries replied on the request, 6 did not reply.
- 16 countries provided data, 3 stated unavailability of data.
- 8 countries could provide complete sets, i.e. generated waste amounts for the whole national economy.
- The remaining 8 data sets received covered only specific sectors (e.g. manufacturing industry), certain aspects (waste to landfills) and/or certain waste categories (e.g. hazardous waste only)

Table 2 provides an overview of all data which were suitable for the analysis on the basis of six-digit LoW codes. It contains data from the data request for 12 countries and data from the questionnaire for 9 countries, four of which already provided data in the context of the data request. Thus the analysis covered a maximum of 17 different countries. A more detailed overview of the data included in the analysis is provided in Annex 4.5.

Table 2: Overview of data selected for statistical analysis

Country	Year	Data coverage	Source
CZ	2004	All sectors	Data request
EE	2005 & 2006	All sectors	Data request
EL	2004	All sectors	Data request
FI	2006	All sectors	Data request
FR	2006	only HW with gaps for agriculture and services	Data request
HU	2004	All sectors	Data request
IE	2004	Waste from manufacturing sector	Data request
LV	2006	All sectors	Data request
NL	2004	Non-haz. waste (NACE C-E)/hazardous waste all sectors	Data request
PL	2004	All chapters except 20	Data request
PT	2004	All sectors	Data request
SI	2004	All sectors	Data request
BG[2]	2004	99-codes, All sectors	Questionnaire
DE[2]	2005	99-codes & unused codes, All sectors	Questionnaire
HU[2]	2004 to 2006	99-codes & unused codes, All sectors	Questionnaire
IT[2]	2004	99-codes & unused codes, All sectors	Questionnaire
LT[2]	2005/06	99-codes & unused codes, All sectors	Questionnaire
LV[2]	2004	99-codes, All sectors	Questionnaire
NL[2]	2006	99-codes & unused codes, All sectors	Questionnaire
RO[2]	2004	99-codes, All sectors	Questionnaire
SI[2]	2004	99-codes & unused codes, All sectors	Questionnaire

The provided data were rather heterogeneous, particularly with regard to the following aspects:

- Data refer to different reference years; some countries provided data for more than one reference year.
- Missing and real zero values are treated differently in data from data request: sometimes 0 means "code not used", sometimes it means "data is confidential", examples:
    - one country provided a complete list of all 839 codes -> 0-value means "code not used"
    - two of the countries provided only used codes -> 0-value means "confidential"
    - the remaining countries provided an incomplete list with (far) less than 839 codes: 0-value or missing codes means "code not used"
- Data has different level of details: HU, for instance, provided data by several NACE branches for each LoW-code.
- Data has different coverage either by waste types (PL) or economic activity (IE, NL) or both (FR), or covers only 99-codes (applies to all data sets from the questionnaire)
- Data has different statistical level: Sometimes amounts refer only to the sampled statistical units, sometimes data was extrapolated for the whole country

- In eight cases waste-keys not listed in the LoW were used, mostly as additional codes, but in a few cases also codes from the “old” EWC

As a consequence of the above limitations it was necessary, depending on the scope of the individual analysis, to make a careful selection of suitable datasets, leading to varying sets of countries presented in the different result tables.

The analysis consisted of two major stages:

1. The first part consisted of several analyses covering only partial aspects of the LoW (i.e. of unused and additional codes as well as the usage of 99-codes) on a higher level of aggregation (chapter, sub-chapter, EWC-Stat)
2. The second part covered the whole LoW and provides information on the frequency of usage and the national amounts on the level of all individual six-digit LoW-codes

The following chapter outlines briefly the methodological issues of all data analyses.

Part 1 – Analysis of partial aspects on aggregate level

The following analyses were carried out on a more aggregated level in order to gain an overview (the information in brackets refers to the chapters where the results are presented):

<u>Amounts assigned to 99 entries</u>

This analysis focussed on the shares of amounts assigned to 99-codes from the total national amounts generated. The analysis covered the following levels:

- Share from the total national waste generation
- Shares from the totals of EWC-Stat categories
- Shares from the totals by chapters and sub-chapters of the LoW

On the national level and the level of EWC-Stat categories, data from the request and the questionnaire were used. For the latter the total amounts generated for the whole economy and by EWC-Stat-categories were estimated on the basis of the available WStatR-data. The analysis on the level of LoW (sub-) chapters was restricted to the data from the data request.

<u>Frequency of unused codes</u>

The analysis of unused codes covers the frequencies of unused codes in relation to the number of available codes. The analysis resulted in the shares of the number of unused codes from the available codes for the levels of:

- the whole LoW (i.e. number of unused codes/839)
- chapters and sub-chapters

For the analysis both data sources (request/questionnaire) were used and those country data selected that were most stable and representative.

Part 2 – Analysis of complete LoW on the level of six digit codes

In this analysis the frequency of usage and the amounts relative to the national totals on the level of six-digit LoW-codes over the number of countries covered was determined. It is characterised by the attempt to maximise the number of countries available. The approach was to group the data shown in Table 2 into four categories reflecting the quality and quantity of available information:

1. Data from the request covering the whole economy ("all sectors"): For this group of countries the whole LoW is covered, as either an amount > 0 is available or the code was not used (CZ, EE-2006, EL, FI, HU, LV, PL[5], PT, SI).
2. Data from the request NOT covering the whole economy: This group contributed to the results only for the LoW codes listed, as the codes not listed could as well have been used in the missing sectors of the economy (NL, IE, FR).
3. Data from the Questionnaire for unused codes and amounts of 99-codes: For this group again the whole LoW is covered; for 99 codes quantities are available, the unused codes are directly listed and the remainder can be concluded as used codes but without quantitative information (DE, IT, LT).
4. Data from the Questionnaire ONLY for amounts of 99-codes: Identical to group 2, but further restricted to 99-codes (BG, RO).

This approach led to a varying number of countries which provided information on the usage/amounts for each individual waste code directly (data request) or indirectly (questionnaire/unused codes), with a maximum of 17 countries. In order to minimise the influence of the countries size on the waste amounts generated by six-digit LoW codes, indicators were calculated by setting all available amounts in relation to the national total amount generated for hazardous and non-hazardous waste, respectively. Whenever the national amounts were not available/not complete in the data from the Questionnaire or data request, the amounts reported on the basis of the WStatR were used as estimators.

The results for all individual LoW codes are presented in Annex 4.6 for non-hazardous wastes and in Annex 4.7 for hazardous wastes in the sorting order of the LoW. From these complete lists the following groups of interest were filtered and listed separately:

[5] Poland is listed in group 1, as the gap in coverage is defined by waste category, i.e. only codes from chapter 20 were not covered

1. Two tables showing those waste codes with the lowest degree of usage and the smallest amounts for hazardous and non-hazardous waste, respectively (see Annex 4.11 and Annex 4.12)
2. A table containing all 99-codes (see Annex 4.4)
3. A table containing the codes with the highest amounts for hazardous and non-hazardous wastes (see Annex 4.13)

These separate listings shall assist in the assessment of codes that may be redundant (1), of 99-codes which are particularly problematic (2) or of codes which may be too unspecific (3).

The approach to set all amounts on the basis of the individual waste code in relation to the total national amounts results in very small values. In order to assist in the interpretation of these values, the following graphs and tables shall provide some guidance.

Table 3 shows the amounts as provided in % in the result tables and to which absolute amounts they correspond in small or large countries with typical national waste generation figures.

Table 3: Exemplary presentation of the effect resulting from the calculation of indicators in relation to national total amounts generated – examples for small and large countries and hazardous (HZ) and non- hazardous (NH) waste

		National total amounts [t] for			
		Small country		**Large country**	
Amount in relation to national total		**HZ**	**NH**	**HZ**	**NH**
		5.000	**200.000**	**5.000.000**	**200.000.000**
ratio	percentage	corresponding absolute amounts [t] per waste code			
10^{-1}	10%	500	20.000	500.000	20.000.000
10^{-2}	1%	50	2.000	50.000	2.000.000
10^{-3}	0,1%	5	200	5.000	200.000
10^{-4}	0,01%	0,5	20	500	20.000
10^{-5}	0,001%	0,05	2	50	2.000
10^{-6}	0,0001%	0,005	0,2	5	200

The values in Table 3 give an impression how the low percentage values calculated for each LoW code may be interpreted in terms of the quantitative relevance of the waste type within a countries waste management system. For example, if for a certain waste code the average of the relative amounts of a certain number of countries is 10^{-6} (or 10^{-4} %), then this average can be interpreted to correspond to absolute values of 0.2 tonnes in a small country or 200 tonnes in a large country for non-hazardous waste, or 5 kg/5 tonnes for hazardous waste. These figures are certainly very low in absolute terms, but how can these values be interpreted in relation to the remaining wastes from the LoW. Are there many other codes that have still lower waste generation figures? In order to assess the quantitative relevance of a certain LoW code in relation to the other wastes from the LoW, the following paragraphs shall provide more insight.

For each code of the LoW, all available amounts were put in relation to the respective countries total generation, and subsequently, mean, median, minimum and maximum of all the relative amounts were calculated for each LoW code. In the next step the means and medians of all LoW were grouped according to their values on a logarithmic scale and the frequencies of LoW codes were plotted over these intervals.

The intervals start at values below 10^{-4} % of the national amounts, i.e. the generated amount of the waste type was less than one millionth of the national amount, and this on average over all countries which provided quantitative data for this waste type according to LoW. The highest group refers to average shares from national amounts of between 10 % and more and is labelled “< 100 %”.

Note that neither for non-hazardous nor for hazardous waste amounts were available for all waste types according to LoW codes. However, the results cover 821 of the 839 waste codes. Of the missing 18 codes, two were not used by any country, 1 was used by 3 countries and the remaining were used by one or two countries, but no quantities were available for any of the used codes.

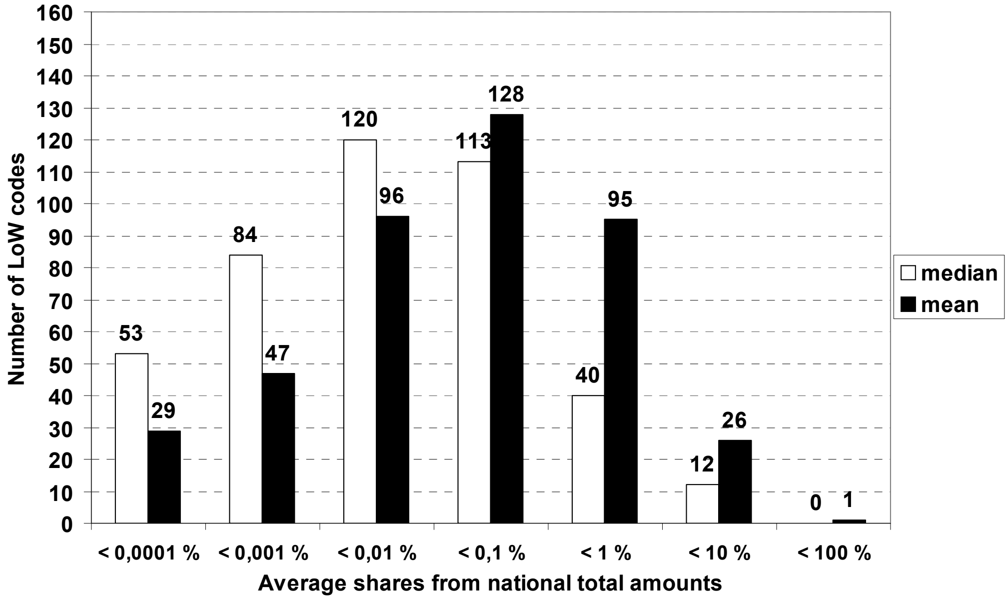

Figure 1: Frequency distribution of average shares from national amounts for 422 of 434 non-hazardous waste codes

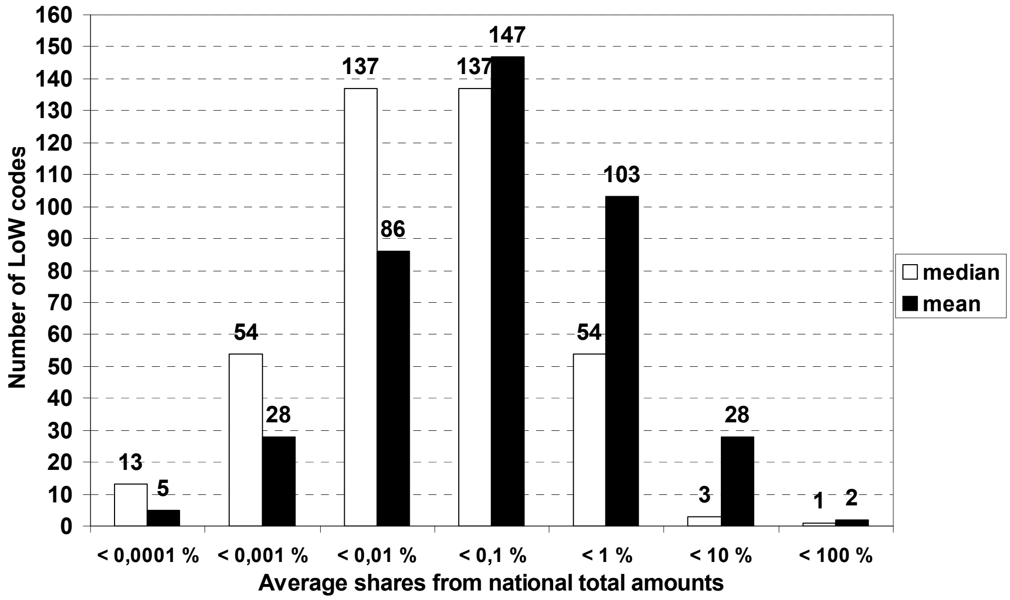

Figure 2: Frequency distribution of average shares from national amounts for 399 of 405 hazardous waste codes

The figures above show, as would have been expected, distributions similar to the normal-distribution with the largest number of keys in the medium range of amounts (< 0.1 %) and by far fewer codes with large amounts of 1 % and more (groups: <10 % and < 100 %). In either figure there is still a moderate number of codes in the group of lowest values, i.e. with average national shares below 10^4 %. This means, that for non-hazardous waste about 12.5 % (53 codes based on median) of 422 codes make up less than a millionth of the national amounts. The corresponding value for hazardous waste is much lower with about 3 % of 399 codes

(13 codes based on median). In general, it can be observed that for hazardous waste the distribution is more close to a normal distribution than for non-hazardous waste where the number of codes with lower average national shares is much higher.

The differences between the means and the medians can be explained by the fact that for most codes outliers were observed at the upper end of the scale with far higher amounts than the remaining values. This leads to results where the mean is in general higher than the median, so that the frequency distribution by means is characterised by a larger number of codes in the groups of high waste amounts and, consequently, lower number of codes in the groups of small waste amounts. Obviously it is often the case that even if a waste type is observed only in small amounts in a majority of countries, that in a few countries the code has a much larger relevance in terms of generated amounts.

However, the median is seen as a more suitable parameter to represent the average over all countries and will be used throughout this document when referring to the average.

Analysis of Guidance Documents

The aim of this task was to identify, collect and analyse guidance documents, tools and other relevant documents that are used in Member States to support and specify the application of the LoW.

Several guidance documents have already been collected in previous projects (i.e. guidelines of the Netherlands, the Flemish region, Germany, UK etc.). Additional guidelines, if existent, were identified and gathered through the questionnaire survey and by screening through internet.

The collection phase for the relevant documents via questionnaire survey (in addition to the already available documents) was scheduled to take up to 3 months and was completed by January 15, 2008.

During the first month of the project a primary assessment scheme has been prepared. When all documents were collected the analysis and assessment phase started and was finished by the end of project month 5.

The outputs with regard to the analysis of guidance documents are as follows:

- List of guidance documents, tools and other relevant documents used in Member States for LoW application
- Assessment of the guidelines with regard to the aspects (see chapter0).
  - Structure and applicability of the document;
  - Depth of the guidance and possible interpretation leeway with regard to
    - Origin (sector/process) specific information
    - Waste type specific information
    - Mirror entries
  - Gaps leading to classification problems;
  - Rules leading to diverging classifications;
- Synopsis of the guideline contents with regard to the points to be discussed under task 2.
- Compilation of useful definitions and approaches for the rules to be developed under task 2 and for the revision of LoW under task 3.

The list of guidance documents, tools and other relevant documents used in Member States for LoW application is completed. The list includes all guidance documents which are indicated by

- the EU Circa-platform,
- the return from the questionnaire,
- through investigations on the internet.

The compiled list of guidance documents is enclosed in Annex 5 to this report.

The primary assessment scheme was prepared to screen the guidelines with regard to the aspects:

- Structure and applicability of the document;
- Depth of the guidance and possible interpretation leeway with regard to
  - Origin (Sector/Process) specific information
  - Waste type specific information
  - Mirror entries

This primary assessment scheme was applied to the available guidelines only. It provided the basis to select guidelines for further assessment with regard to:

- Rules leading to diverging classifications;
- Compilation of useful definitions and approaches for the rules to be developed under task 2 and for the revision of LoW under task 3.

Guidelines which did not give any detailed information on the classification of wastes for which mirror entries exist or which did not define additional limit values or characterization approaches other than in the EU legislation were not further contemplated. If guidance documents of several Member States use the same system, the most detailed guideline was chosen to represent all other guidance documents.

Transposition of Decision 2000/532/EC in Member States

In part 2 of the questionnaire the Member States were asked for information on the date the LoW entered into force, and on the way the LoW was implemented (i.e. possible modifications of codes or of classification procedure). The available information is summarised in Table 4.

Table 4: Transposition of LoW in Member States

Country	Effective[1)] since	Has the LoW been adapted to national requirements?	Has the classification procedure been adapted?
Austria	-	AT uses national classification and LoW in parallel	-
Flanders (Belgium)	-	-	yes
Bulgaria	April 2004	no	no
Czech Republic	1.1.2002[1]	no	no
Estonia	June 2002[2]	Adaptations of existing codes and introduction of new ones	
Finland	1.1.2002	Adaptations of limit values for H4, H5, H6; introduction / adaptation of codes	no
France	April 2002	no	no
Germany	1.1.2002	no	no
Hungary	1.1.2002	no	no
Ireland	2002[3]	no	no
Italy	1.1.2002	no	no
Latvia	July 2002[2]	no	no
Lithuania	2003	no	no
Netherlands	May 2002	no	no
Poland	1.1.2002[2]	Yes, introduction of new codes	
Romania	2002[2]	no	no
Slovenia	2001, amendments in 2003	no	no
Spain	20.02.2002		
Sweden	1.1.2002	no	no
UK	2002	no	no

The information in the table is taken from the returns of the questionnaire if not marked otherwise.

1) For some countries the reported date seems to refer to the date of publication rather than the date of coming into force.

2) Information from [EUROSTAT 2003]

3) Information from [OEKOPOL 2006]

The table shows that most of the countries that responded to these questions transposed Decision 2000/532/EC without changes. Major deviations or changes like the use of a national classification, the introduction of new waste codes, changes of limit values for H-criteria or a modification of the classification procedure are known from Austria, Poland, Estonia, Finland and Flanders:

- Austria uses a material-based national waste list for the permission of treatment, recovery and disposal facilities (ÖNORM S 2100). The wording of the LoW is used in cases, where it is required by Community law (e.g. Decision 96/302/EC[6], Decision 94/774/EC[7], Decision 2003/33/EC[8] or the Waste Shipment Regulation).
- Poland has added about 80 additional waste codes (6-digit-level) and 3 additional sections (4-digit-level) to the 839 codes defined in Decision 2000/532/EC. The additional codes are said to represent waste types that are characteristic for the Polish industry and the waste management system. The codes were introduced with the aim of an optimal characterisation of the waste types, in particular of those that are important in terms of quantity. However, Poland concedes that the lobbying by the waste generators might also have influenced the introduction of the national codes. The national codes are integrated in the LoW-coding system and end with the digits 80 to 8x. The complete list of the national Polish codes is shown in Annex 7.1.
- Estonia added new wastes codes (27 codes; 6-digit level) and modified the wording of existing LoW-entries (5 codes were adapted) in order to adapt the LoW to the national needs. Several changes relate to wastes from the use of oil shale for energy production. The wastes from oil shale processing and combustion are specific for Estonia. They are mostly hazardous and make up considerable quantities. Several other national codes refer to medicine waste and used medicines. New codes are integrated in the coding system of the LoW and end with the digits 9x. The whole list of additional and adapted codes in Estonia and the reasons for their introduction is shown in Annex 7.2.
- Finland introduced two new codes and did a few modifications of existing entries. In addition, limit values for the H-criteria H4, H5 and H6 were changed or specified. The national amendments include:

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[6] Commission Decision 96/302/EC of 17 April 1996 establishing a format in which information is to be provided pursuant to Article 8 (3) of Council Directive 91/689/EEC on hazardous waste

[7] Commission Decision 94/774/EC of 24 November 1994 concerning the standard consignment note referred to in Council Regulation (EEC) No 259/93 on the supervision and control of shipments of waste within, into and out of the European Community

[8] Council Decision 2003/33/EC of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC (2003/33/EC)

  - All waste medicines from consumers and health care sector are classified as hazardous (18 01 09*, 18 02 08*, 20 01 32*).
  - H4: The limit value for irritant substances classified as R41 was lowered to 5 %.
  - H5 and H6 were specified by setting a separate limit value for substances which can cause long-term health effects.
  - A general provision for H4 to H8, H10 and H11 was introduced that the limit values in the EC List of Dangerous Substances will be used when they are lower than the values set in the Finnish Waste Decree.

  For more details concerning the Finnish modifications please refer to Annex 7.3.

- The Public Waste Agency of Flanders, OVAM, has published a 6-step decision tree that deviates from the 4-step classification protocol according to the introduction of the Annex of Decision 2000/532/EC. The modified procedure is intended to eliminate some ambiguities that might arise when applying the four-step process as published in Decision. The decision tree is shown in vol. 4 Annex 6.2
- Some Member States (e.g. Estonia, Germany) use national sub-lists (8-digit codes) to the LoW in case the LoW-codes are not specific enough:
  - Estonia has established sub-lists for metal waste and for waste electrical and electronic equipment.
  - In Germany 8-digit codes are used for statistical purposes, e.g. for further specification of mixed municipal waste (20 03 01) and of components from dismantling and maintenance of ELV (16 01).

Use of LoW for statistical purposes

Together with the statistical data the EU Member States have to submit quality reports to Eurostat. The quality reports provide information on the methodologies applied in Member States and on the quality of the compiled statistics.

For task 1.2 the quality reports were reviewed with regard to the question which classifications are used by the Member States for the collection of statistical data. The analysis yields an overview of the use of the LoW for statistical purposes in EU Member States.

For the compilation of waste statistics, Regulation 2150/2002/EC has introduced the statistical waste classification EWC-Stat (Ver.3). The EWC-Stat is a substance-oriented classification that is defined in Annex III of Regulation 2150/2002/EC by reference to the LoW.

The Regulation on waste statistics defines the formats for reporting, i.e. the breakdown of generated and treated quantities by waste categories according to the EWC-Stat but does not prescribe a specific classification to be used for data collection. Countries are free to use any waste classification for data collection as long as they can produce the defined formats in the required quality.

Available options for data collection are:

- use of the LoW and conversion of results according to the transposition table in Annex III of Regulation 2150/2002/EC;
- direct use of the EWC-Stat;
- use of national classifications or survey-specific waste categories, and subsequent conversion to EWC-Stat.

For the present study it is of interest to investigate which of these options is the preferred one in EU Member States, i.e. which role does the LoW play in waste statistics.

The results of the review are summarised in Table 5. The table contains information on all EU Member States with the exception of Cyprus, Greece, Malta Portugal and Spain for which no reliable information on the subject was available. The information refers to the data collection for the reference year 2004, i.e. the first reference year of data collection according to Regulation 2150/2002/EC.

Table 5: Waste classifications used for the compilation of waste statistics in EU Member States (EU 27)

Member State	Uses LoW	Uses other classification	Remark
Austria		X	AT uses the ÖNORM 2001
Belgium	X	X	BE uses LoW, EWC-Stat and regional classifications
Bulgaria	X		
Czech Republic	X		
Germany	X		
Denmark	X	X	DK uses LoW for hazardous waste and ISAG classification for non-haz. waste
Estonia	X		
Finland	X		
France	X	X	FR uses LoW (for some haz. waste), EWC-Stat (industrial waste) and presumably further informal classifications
Hungary	X		
Ireland	X		
Italy	X		
Lithuania	X	X	LT uses LoW and EWC-Stat in parallel
Luxembourg	X		
Latvia	X		
The Netherlands	X	X	NL uses LoW for administrative data (haz. waste, IPPC-reports) and presumably other classifications
Poland	X		
Romania	X		
Sweden		X	SE uses EWC-Stat
Slovenia	X		
Slovak Republic	X		
United Kingdom	X	X	UK uses mainly LoW and in addition UK classification for some domains.

Note: The table does not cover the Member States Cyprus, Greece, Malta, Portugal and Spain because no reliable information was available.

The information provided in the quality reports is not exhaustive but gives a clear picture:

- The use of the LoW for data collection is by far the most frequent approach. Most EU countries use the LoW as sole waste classification, some countries us it in combination with other classifications.
- The direct use of the EWC-Stat for data collection is applied by only a few countries including France and Sweden. Lithuania used the EWC-Stat in parallel to the LoW but will end this practice and apply only the LoW.
- The application of national waste classifications is limited to a few countries including Austria and Denmark (for non-hazardous waste). BE (Walloon and Flemish region) and UK (England) applied national or regional lists for the year 2004 in addition to the LoW but UK and the Flemish region pointed out that they will use only the LoW in future.
- Survey-specific waste classifications are applied in several countries in addition to the approaches mentioned above, e.g. for data collection on municipal waste, construction and demolition waste, end-of-life vehicles, etc. The quality reports do not provide detailed information on these classifications. However, their application is usually limited to specific domains of data collection.

Hence, the LoW is established in the EU as the main classification not only for administrative purposes but also for waste statistics. The reason for the frequent use of the LoW for statistics is not necessarily his suitability for statistical purposes. For countries that rely on administrative data sources for the compilation of waste statistics the use of the LoW is a quite natural approach as certain administrative documents (permits, notifications of hazardous waste shipments) have to refer to the LoW. Furthermore, the LoW is well established in most Member States for administrative purposes and the parallel use of different classifications has clear disadvantages (additional burden to enterprises, possible negative impacts on data quality).

Guidance on LoW application

Sources

Guidance documents and tools used in the EU Member States to support and specify the application of the LoW were collected. 24 guidance documents and other tools originating from 10 Member States were assessed in total. The table "List of guidance documents and tools" in Annex 5 gives an overview.

From the following 17 Member States no guideline could be identified or was pointed out in the questionnaire:

Austria, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Greece, Hungary, Italy, Lithuania, Luxemburg, Malta, Poland, Portugal, Romania, Slovak Republic., Slovenia.

The guidance documents derived from previous projects and the EU-Circa Platform and from answers to the questionnaire. The internet inquiry resulted in two additional documents and the updates of 4 guidance documents from the EU-Circa Platform. As the guidelines and other tools have various objectives, structure and target groups a first assessment was undertaken to find the most promising documents with regard to task 2 and 3.

Description and assessment

The first assessment was a screening with regard to the dominant structure of the document. The structure could be comparable to the LoW structure or follow a different system by referring, for instance, to industrial branches or to the material-oriented statistical nomenclature EWC-Stat.

Then the depth of the guidance was contemplated with regard to practical examples, calculation methods and a description of a specific assessment of hazardous wastes.

Additionally the documents were analysed regarding:

- Are there supplementary definitions or limits given for H9 and H12 to H14?
- Are there testing methods or calculation named?

The answers to these questions were condensed in the table "Primary Assess of Guidance Documents" (see Annex 6.1)

The main objective of most guidelines is to explain the system of the LoW and to support its application. The level of detail of the documents varies. Most documents do not tackle the specific application of H-criteria in-depth.

Guidelines with a comprehensive approach to the H-criteria of the LoW

Documents, which contemplate all hazardous criteria directly and comprehensively, are the guidance document 'Hazardous waste. Interpretation of the definition and classification of hazardous waste (Technical Guidance WM 2.1)' from UK [UK 2006] and the Latvian draft guideline (LV 2005A), which is almost identical with parts of the UK document]. The UK guideline focuses on the determination of the hazardousness of waste with mirror entries (appendix B) and all H-criteria are assessed in a separate volume (appendix C). In most cases detailed decision making schemes are included. The guidance document [UK 2006] is very thorough and detailed and leaves little room for interpretation with regard to waste type specific information and mirror entries classification.

The German 'Guidelines on the Application of the Waste Catalogue Ordinance [DE 2005] pays particularly attention to the assignment of hazardous properties in the case of 'mirror entries', explains the hazardous properties H1 to H14 and a system for the assignment of these properties. *"Not all hazardous properties are* *specified in the Waste Catalogue Ordinance (only H3 to H8, H10 and H11). In the interests of a uniform application, explanations are given in these guidelines for the other non-specified properties, which allow easily identifiable classifications to be made.*" With regard to the hazardous criteria assessment the document is comprehensive and tackles all H-criteria.

The Dutch Guideline [NL 2001A] has a clear and easy to follow determination scheme for the classification of waste. Its search- and decision making scheme offered in the first two steps for the identification of the waste is identical with the approach in point three of the introduction section of the LoW. In case the waste has a mirror entry the following decision tree is followed (see also Annex 6.3):

- Step 3: Waste with a flash point below 55°C is hazardous.
- Step 4: The composition of the waste, i.e. the contained substances and their concentrations, is determined and further assessed on the basis of the R-phrases in steps 5 to 7.
- Step 5: Comparison of the contained substances with the substances in Annex 2 of the Dutch guideline.
- Step 6: Comparison of the contained substances with the substances in Annex 1 of the Substance Directive.
- Step 7: Determination of R-Phrases on the basis of existing data (physical-chemical properties, toxicity, ecotoxicity).
- In step 8 a scheme with all R-phrases and the respective concentration levels offers a guidance to decide the hazardousness.

In a separate table substances, which render the waste hazardous, are connected to R-phrases, H-criteria and limit values, where available. A second table is structured according to the R-phrases. The limit values are in line and do not go beyond the relevant EU legislation. The document makes no references to the criteria H13 and H12 (except for Cadmiumcyanide-R32-H12). For H14 no bio tests are proposed, but concrete substances listed which fulfil these criteria. H14 is connected the R-phrases R50-R59.

The guidance document is accompanied by a second volume that includes practical examples for training [NL 2001B] and does not refer to any production processes.

Guidelines and tools, which take a practical waste producer orientated approach:

Three of these documents from Belgium [BE 2004], Finland [FI 2005D] and Baden-Württemberg [DE 2003] feature a production related approach and are structured from the point of view of a waste generator.

They support the waste producer to assign the relevant waste codes by offering a pre-selection of waste codes linked to production steps, which are illustrated in the guidance document. This pre-selection also includes 99 codes and mirror entries from the LoW.

The Finish guideline of 1999 includes also statistical codes, but its updated version, the guideline FI 2005D, refers to LoW codes only. The waste is classified according to the business sector and then to the production activity. If a waste doesn't have an own category in the business sector, the waste is classified according to its generation process or type of waste. Where for a certain type of waste from the production a hazardous code and a mirror entry are applicable, both codes are mentioned. For the application of hazardous criteria to determine the hazardous waste from the non-hazardous mirror entry no specific information is given in the document.

The guideline from Baden-Württemberg [DE 2003] also classifies the waste according to the business sector and then to the production activity. "*The aim is to assign real wastes to the suitable waste codes*".

It comprises of three volumes:

- Part A: Legal basis; LOW to sub-chapter 10 13,
- Part B: Sub-chapter 11 01 through 19 13,
- Part C: Chapter III, options for disposal and recovery.

For the sub-chapters of the LoW following information is available:

- Industrial process description.
- Material flows "Waste" and classification in waste categories.
- Notes on appropriate disposal and recovery processes.
- Matrix on waste code/material flow.

"In addition the so-called mirror entries were taken into consideration. In some cases it was possible to solve potentially contentious classification and allocate waste to hazardous or non-hazardous categories." The limit values or criteria for the determination of the hazardousness of wastes, for which mirror entries exist, are not stricter than required by EU regulations. But the assignment to the type of waste and to the production process supports the correct decision making by the waste generator.

The Belgium guideline by OVAM [BE 2004] explains the hazardousness of waste by the obvious characteristics of the waste, e.g. tar-containing, base/acid, halogen-containing, asbestos-containing. The definition is linked to waste codes and refers to concrete limit values for specific substances or substance groups and the respective detection methods. The following example concerning oil-containing waste shall illustrate the approach of the OVAM-guideline:

"*A waste stream is described as oil-containing if it has a mineral oil content of more than 2%. The determination of the mineral oil content take place with the analytical method from the Analysecompendium of VITO (CMA)…Most oil-containing waste streams are found in chapter 12 and 13 of the EURAL list. In case a real oil stream is concerned, it is clear that here always an oil-containing (and therefore hazardous) waste is meant. Examples from the EURAL list are…. 050105*, 0501012*, 080319*, 120106*…..The less specific, potentially oil-containing waste streams of the EURAL list are numerous, but are situated mainly in the EURAL chapters 12 and 13. Some examples from other EURAL chapters are excluded here: 010505*, 050106*,…. 170410*….* " ([BE 2004] page 11-12).

The guideline introduces a flow scheme for the allocation to the waste codes which differs slightly from the scheme of the European LoW. It is a six step approach which starts with the identification of "*exclusively packaging*" at the beginning (see Annex 6.2) and examples for the use of this scheme are given.

For the definition of hazardous criteria the guideline states that „ *some clear criteria defined in* [BE 2004] for *some of these characteristics that are relatively easy pursuable (e.g. concentrations of flammability) ...for another part of these characteristics there are criteria indicated in the Preparation Directive (99/45/EG)....*" Annex 3 of the guideline summarizes the hazardous criteria in a table. The R-Phrases indicated here refer to Directive 67/548/EEG ("Substances Directive") and the concentration limits are drawn from Preparations Directive. So the definition of the hazardous criteria in the guideline generally do not go beyond the EU Directives, but the systematic approach guiding the waste generator to characterize the waste is detailed and clear.

The application of the hazardous criteria is explained in detail and a very comprehensive sector specific assignment of waste codes and relevant examples of wastes from this production steps. In the production specific chapter the pre-selection of waste codes related with different production steps takes place and includes 99 codes and mirror entries. The classification has still to be carried out by the waste generator, but the choice of codes from the LoW is already limited to make the LoW more applicable. So the guideline is very user friendly and apt for application by industry.

Another document, which is of interest for practical application by the waste producer, is the transnational HWIT Hazardous Waste Identification Tool. HWIT was developed under the project HAZTRAIN led by the Clean Technology Centre (CTC), Cork Institute of Technology and therefore found under the Irish No. [IE 2007]. The tool takes a step-by-step approach to the identification of the hazardous components of any given waste in accordance with EU legislation and aims to support for the waste generator.

The tool guides the user through three assessment steps where the known characteristics of the waste has to be filled in and requests data on various analyses. In connection with a data base the assessment of the hazardousness of the waste is then carried out by the programme. Within this study the data base could not be accessed.

Guidelines and documents restricted to specific issues

The French document [FNADE 2003] refers to landfill criteria/waste acceptance. Nevertheless it provides some interesting information for Hazard-criterion H14.

One German document " Vollzugshinweise zur Zuordnung von Abfällen zu den Abfallarten eines Spiegeleintrages" [DE 2007D] focuses on eco-toxicity with regard to a specific testing regulation.

One document [UK 2007B] refers mainly to related hyper links.

The German document HAZARD-Check: Die Bewertung der Gefährlichkeit der Abfälle and the transnational HWIT-document Hazardous Waste Identification Tool [IE 2007] are related to data base applications.

The Dutch document EUROPESE AFVALSTOFFENLIJST (EURAL) Praktijktraining [NL 2001B] is actually more for training issues.

The Spanish Ministerial Order of 1989 defines the hazardousness of waste without mentioning of H-criteria and in a different systematic. In the Annex to the Ministerial Order methods for the analysis of flash point, eluate and leachate and bio test for leachate are described at a level of a technical norm. An overview on the hazardous waste characterization by Ministerial order 1989 is shown in Annex 6.4

Documents which were not further assessed with regard to H-criteria

These guidance documents leave a lot of interpretation leeway and therefore not further assessed.

The Swedish guideline "Farligt avfall - Handbok 2003:8" was not further assessed due to the information from the Swedish questionnaire. There, the Swedish EPA states that "the handbook is dealing with the general provisions for the implementation of Directive 2000/532/EC but is insufficient with regard to classifying waste."

The Irish guideline [IE 2002] transposes the LoW and offers a general assessment scheme, which refers to the Irish Waste Management Act, 1996 to define the properties of hazardous waste. The Waste Management Act, 1996 transposes the Annexes 1 to 3 of the Directive 91/689/EWG directly. (see Annex 6.5). No additional guidance for the classification of waste is given, but it makes reference to the transnational HWIT Hazardous Waste Identification Tool by the Clean Technology Centre (CTC), Cork Institute of Technology [IE 2007])

Guidance documents for the extraction of additional information with regard to the H-criteria:

In the next step those guidelines were selected which are promising in particular with regard to additional definitions and approaches for the rules to be developed under task 2. The documents for further contemplation were chosen on the basis of the primary assessment based upon the content of further methods, limit values etc. for the application of H-criteria. Those documents giving a deeper insight into the set of problems, giving practical examples, calculation methods, testing methods or further limit values and documents based on other promising regulations or guidelines were selected. The selected documents are shown in Table 6.

The further analysis of guidance documents focused on the hazard criteria H9, H12, H13 and H14. In addition, H7 was included as some countries mentioned problems with the application of H7 in their answers to the survey questionnaire.

Table 6: Guidance documents for further assessment of H-criteria

Guidance document (Nr.)	H-criteria considered
Europese afvalstoffenlijst EURAL Handleiding [BE 2004]	H7
METHODOLOGICAL GUIDE Waste classification. Practical application to storage centers [FNADE 2003]	H14
Guidelines on the Application of the Waste Catalogue Ordinance of 10 December 2001 [DE 2005]	H7, H9, H12, H13, H14
Vollzugshinweise zur Zuordnung von Abfällen zu den Abfallarten eines Spiegeleintrages. Germany, Brandenburg [DE 2007C]	H13
Hazardous waste. Interpretation of the definition and classification of hazardous waste (Technical Guidance WM 2.1) [UK 2006]	H7, H9, H12, H13, H14

The complete analysis of the primary assessment for each document is condensed in table "Primary assessment scheme", vol. 4 Annex 6.1. The table shows a synopsis of guideline contents with regard to the subjects of task 2. For the assessment of the guidelines with regard to the mentioned H-criteria please refer to volume 2 of the report.

Classification problems

The spectrum of answers concerning classification problems is very broad, ranging from general structural deficits to detailed aspects concerning specific codes. A lot of answers overlap with the questions concerning the additional waste codes and the question concerning the H-criteria.

The classification problems addressed in the questionnaires can be grouped as follows:

- Problems resulting from the structure of the LoW and the classification procedure;
- Problems concerning the classification of hazardous waste and the application of mirror entries;
- Problems resulting from the lack of suitable waste codes;
- Ambiguous classification on account of two or more possible codes;
- Problems resulting from unclear or imprecise definitions.

Structural aspects and classification procedure

Classification problems result from the mix of the origin-based approach (chapters 1 – 12, 17 – 19) and the material based approach (chapter 13 to 15).

The mixed structure complicates the classification procedure. Several countries point out that the classification procedure and the instructions are too difficult and need a lot of explanation in order to achieve a harmonised application (FI, LV, HU, NL, FNADE). It is stated as likely that this classification procedure is not strictly followed by all companies / operators. Finland, for instance, points out that companies (and authorities) generally tend to use the sector-specific chapters and rather assign waste to the 99-codes of the respective sector than to look for appropriate codes in the chapters 13 to 16.

Problems arise with regard to chapter 20 on municipal waste. Chapter 20 neither applies the origin-based approach, as it covers wastes from households and from commercial and industrial sources, nor does it follow a material-based approach. This results in questions and ambiguities. The Netherlands, where a helpdesk for LoW applications has been established, indicates that questions concerning the coverage of chapter 20 are among the most frequently asked questions the helpdesk has to handle.

A very practical problem is addressed by Estonia. The names of numerous waste codes are not self-explanatory and can be applied correctly only together with the headings of the respective chapter and/or section. Estonia proposes to clarify the wording of the LoW codes by including all necessary information from the headings of the higher-ranking classification levels in every waste code. Such editorial changes are assumed to prevent misclassification resulting from the disregard of the section and chapter information.

Classification of hazardous waste

Most remarks concerning existing classification problems refer to the classification of hazardous waste. The following points are mentioned:

- The dealing with mirror entries, i.e. the application of chemical legislation to waste, is seen as very time-consuming and difficult task for companies and authorities, preferably in case of some solid, complex wastes of varying composition. Sweden sees this as the main classification problem.
- The Netherlands point out that those problems are encountered in particular where a specific compound in a waste stream is not classified in Directive 67/548/EC and where no R phrases exist.
- Serious problems result from the lack of harmonised criteria, methods and limit values for the hazard criteria H9, H12, H13 and H14. This aspect is not specified here as it is extensively described in volume 2 of final report.
- In some cases the concentration limits for the H-criteria according to chemical substance law are considered to be too high for waste management purposes. Wastes might thus be classified as being non-hazardous

even though the concentrations of hazardous substances are considered to be too high for environmental and waste related objectives. This applies in particular to the 0.1 % concentration limits for dioxins and furans with regard to the criterion H7. Reference is made to the lower limits in the POP-Ordinance.

- Problems exist with regard to the application of criterion H7 to hydrocarbons in general (IT) and to "bituminous masses containing coal tar" in particular (SE). An agreement is necessary with regard to an appropriate indicator and the concentration limit that should be applied.
- Germany sees a major problem in the missing up-date of current data from hazardous substance classification. The legal basis for dangerous substances / preparations has not been implemented in Decision 2000/532/EC according to the latest state (e.g. missing link to the Directive 1999/45/EC).

Lack of suitable waste codes

Classification problems on account of lacking waste codes were mentioned by numerous Member States and stakeholders. Some countries consider this even as the most serious problem.

Possible impact of nonexistent entries:

- Extensive use of 99-codes which is a problem for waste statistics as well as for monitoring / enforcement.
- In the absence of generic codes for hazardous waste (98*-codes) the non-existence of appropriate codes may result in a classification as non-hazardous 99-code which might lead to inadequate treatment of the waste.

A detailed list of proposed waste codes is given in Annex 13.

Several codes exist for one waste type

The problem that a specific waste may be assigned to different waste codes is seen as a frequent problem by several Member States and stakeholders. The examples given refer mainly to the question whether to assign a waste to chapter 20 or to look for appropriate entries in other chapters. The following examples are mentioned:

  - Waste electrical and electronic equipment (WEEE): 16 02 or 20 01
  - Metal waste of non-municipal origin: 17 04 or 20 01
  - Glass packaging: 15 01 07 or 20 01 02
  - Solid oil wastes: 13 08 99* or 15 02 02*

Unclear definitions

- Several comments from Member States and stakeholders refer to classification problems that result from unclear definitions in chapter 19 in general and section 19 03 'stabilised and solidified wastes' in particular:
    - Obviously, the definitions for solidified wastes, stabilised wastes and partly stabilised wastes are seen as totally insufficient and regularly lead to problems. The UK generally questions the term 'partly stabilised waste' because stabilisation is considered as an all or nothing situation.
    - The French association FNADE points out that in France even stabilised wastes are considered to remain hazardous on account of H14. They propose therefore to delete the two non-hazardous entries 19 03 05 and 19 03 07.
- Another comment of UK concerns the codes 19 02 05*/19 02 06. These codes can include sludgy waste from physical treatment, chemical treatment and chemical and physical treatment. UK considers this interpretation as too wide and proposes to classify under these entries only waste that has been both chemically and physically treated.
- Two further comments concerning chapter 19 come from Austria and from FEAD:
    - Austria asks how profoundly a mechanical treatment must be carried out in order to classify waste in chapter 19.
    - FEAD states that it is unclear whether codes of the chapter 19 refer to licensed treatment facilities only of also to on-site waste treatment.
- A comment from Sachsen-Anhalt, Germany, refers to the general lack of a definition for waste, sludges, liquid wastes, suspensions, etc. In some sections (e.g. 08 01, 08 04) the LoW provides different codes for solid, sludgy and liquid wastes without providing clear criteria for distinction.

Use of 99-codes

The 99-codes are intended to be the last resort in the process of waste classification. According to the classification procedure as defined in Decision 2000/532/EC waste should be assigned to 99-codes only in the last step after all chapters were searched for an appropriate code.

The use of 99-codes may indicate that:

- suitable specific entries are lacking in the waste list;
- the classification procedure is not strictly followed which results in an excessive use of 99-codes. Reasons may be problems with the application of the list and its classification procedure, or simply laziness, or the deliberate use of 99-codes in order to disguise the character of the waste.

This chapter analyses on the basis of the available statistical information which quantities of waste are assigned to 99-codes in Member States. In the first step, the amounts assigned to 99-codes are presented in relation to the total national waste generation in order to assess the overall dimension of the usage of 99-codes. In the second step, the results shall give an insight as to which chapters of the LoW are characterised by the highest amounts of 99-codes.

Table 7 shows the amounts of waste that are assigned to 99-codes in Member States, expressed as percentage of the generated waste total. The data are sorted by increasing share of 99-codes. Note that the table contains the results for data from both the questionnaire and the data request.

The overall percentage of 99-codes as given in the table is a very rough figure that should be interpreted carefully. In Bulgaria and Romania, for example, the amounts of waste from mining and quarrying are extremely high and dominate the generated waste total. As a result, the relative share of 99-codes is very low and provides a very favourable picture for those countries. The situation is similar in Estonia where huge amounts of waste from oil shale extraction and processing are generated. The figures are therefore not really suitable for comparison between countries.

Nevertheless, the data show that the use of 99-codes varies considerably between Member States and that the 99-codes may account for a considerable share of the total waste. In most countries the fraction of 99-codes is below 5 % of the total. Shares between 5 % and 10 % are reported by Greece, Portugal and Latvia. In only two cases (Ireland and Lithuania) the values exceed 10 %. In the case of Lithuania, the reason for the very high fraction of almost 40 % is due to the fact that Lithuania reported an amount for the LoW code 060999 (group 0609: “wastes from the MSFU of phosphorous chemicals and phosphorous chemical processes”) which makes up already 37.6 % of the total national amount. In the case of Ireland, the high value of 18 % appears to be the result of the coverage of only the manufacturing sector which is characterised by the highest variety by waste types and presumably the most complex classification problems.

Table 7: Amounts of waste assigned to 99-codes per country and year as percentage of generated waste total

Country	Year	Data source[1)]	Fraction of 99-codes	Data Coverage
Bulgaria	2004	Questionnaire	<0.1%	All sectors
Romania	2004	Questionnaire	0.2%	All sectors
Estonia	2006	Data Request	0.3%	All sectors
Germany	2005	Questionnaire	0.5%	All sectors
Slovenia	2004	Questionnaire	1.4%	All sectors
Hungary	2006	Questionnaire	1.6%	All sectors
Poland	2004	Data Request	2.0%	All chapters except 20
Czech Republic	2004	Data Request	2.5%	All sectors
Italy	2004	Questionnaire	2.7%	All sectors
Netherlands	2006	Questionnaire	2.8%	All sectors
Finland	2006	Data Request	3.6%	All sectors
Greece	2004	Data Request	6.0%	All sectors
Portugal	2004	Data Request	6.2%	All sectors
Latvia	2006	Data Request	9.3%	All sectors
Ireland	2004	Data Request	17.9%	Waste from manufacturing sector
Lithuania	2005/06	Questionnaire	38.4%	All sectors

1) For data from questionnaire, the missing total amounts were estimated on the basis of the available WStatR-data 2004

The analysis of the data by LoW-chapters is shown in Table 8. The table shows the fractions of the amounts of 99-codes in relation to the total amounts of the respective chapter. In order to assess the question, whether the number of available 99-codes within a chapter has an influence on the reported amounts, the number of 99-codes and that of all codes as well as their ratio is provided for each chapter. Note that 99-codes are present in only 16 of the 20 chapters and that the number of 99-codes can make up more than one fifth of all available codes, as is the case in chapter 06. For better illustration, country shares larger than 30 % and average shares larger than 10 % are marked by shading.

Table 8: Fractions of amounts of 99-codes per country and year as percentage of total amounts - by LoW chapter

Chap-ter	Country (Year)									Aver-age	No. of 99-codes	Total no. of codes	Ratio of 99-codes by no.
	CZ (2004)	EE (2006)	EL (2004)	HU (2004)	IE (2004)	LV (2006)	PL (2004)	PT (2004)	SI (2004)				
01	0..2%	0.0%	7.4%	0.0%	20.8%		0.1%	3.3%	12.4%	4.9%	3	23	13.0%
02	6.8%	1.3%	3.8%	3.7%	13.5%	23.8%	5.4%	14.7%	1.4%	8.3%	7	38	18.4%
03	0.7%	1.7%	0.1%	1.8%	0.0%	2.1%	10.4%	4.7%	1.1%	2.5%	3	19	15.8%
04	1.3%	4.2%	0.7%	10.9%	7.5%	42.6%	2.7%	26.7%	3.6%	11.1%	2	21	9.5%
05	39.0%		45.6%	0.0%		0.2%	59.9%	0.2%	0.2%	16.1%	3	24	12.5%
06	3.3%		0.1%	2.1%	64.9%	0.0%	3.5%	9.8%	0.7%	9.4%	11	48	22.9%
07	22.7%	11.8%	0.5%	30.8%	29.4%	4.1%	16.1%	24.9%	10.7%	16.8%	7	78	9.0%
08	1.5%	0.0%	13.8%	6.0%	14.3%	0.0%	34.0%	6.7%	12.7%	9.9%	4	38	10.5%
09	2.0%		0.0%	0.3%	12.6%		36.8%	1.7%	10.3%	7.1%	1	13	7.7%
10	6.0%	0.1%	0.7%	0.9%	4.2%	6.5%	3.3%	7.7%	1.1%	3.4%	13	173	7.5%
11	0.3%		15.7%	3.1%	3.9%	0.8%	0.8%	1.5%	0.3%	2.9%	3	27	11.1%
12	0.3%	0.3%	5.1%	26.1%	2.6%	0.0%	10.2%	3.8%	0.6%	5.5%	1	23	4.3%
13	0.1%	6.5%	0.6%	0.7%	13.8%	0.0%	5.6%	2.0%	1.4%	4.1%	1	34	2.9%
16	0.5%		1.8%	0.3%	0.3%	0.8%	0.5%	18.2%	1.7%	2.7%	2	71	2.8%
19	2.3%	0.5%	85.2%	0.7%	0.2%	0.5%	1.7%	6.7%	0.4%	10.9%	7	98	7.1%
20	2.8%	0.1%	1.4%	8.5%	0.5%	1.8%		3.9%	1.5%	2.6%	2	40	5.0%

It can be seen that for most chapters there is a very high variation of the shares between the countries. The highest average shares of amounts assigned to 99-codes occurred in:

- Chapter 07: Wastes from organic chemical processes (16.8 %)
- Chapter 05: Wastes from petroleum refining, natural gas purification and pyrolytic treatment of coal (16.1 %)
- Chapter 04: Wastes from the leather, fur and textile industries (11.1 %)
- Chapter 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 (10.9 %). In chapter 19, the high average is largely due to the overall highest country value of Greece (85 %).

The lowest shares around 3 % occurred in chapters 03, 11, 16 and 20.

It is difficult to draw a conclusion from the table. However, chapters 04, 05 and 07 can be seen as those with the largest shares over a variety of different countries whereas in the remaining chapters, despite some larger averages, the series is mostly dominated by extremely high shares of only one or a few countries. No relation can be observed between the degree of usage of 99-codes and possible parameters of influence such as the total number of available codes per chapter, the number of 99-codes per chapter or the ratio of these. In addition, the above results by chapters show no relation to the number of proposed additional codes as presented in vol. 4 Annex 13.

A similar analysis on the basis of sub-chapters was performed but showed even larger variations and thus allows no clear conclusions that would be representative over the countries covered by the analysis. The results of the analysis by sub-chapter are presented in vol. 4 Annex 4.9.

The analysis of the 99-codes on the level of six-digit codes showed that the average shares from the national totals of all 99-codes are below 1 %, with the largest averages observed for 100299 (group 1002 "wastes from the iron and steel industry"; median: 0.1 %, mean: 0.3 %). Only 16 of all 99-codes have an average share from the national totals of 0.01 % and larger. They are mostly from chapters 02, 10 and 19 (refer shaded codes in vol. 4 Annex 4.8, were the frequency of usage and the descriptive parameters of share from national amounts are presented for all 99-codes).

Unused LoW codes

Codes that are unused by most or even all of the countries may be redundant. The same applies to codes which are used more frequently but which are characterised by very small amounts. If a chapter or sub-chapter of the LoW contains mostly codes which may be redundant because of their little relevance in terms of usage or amounts, the chapter may be reviewed accordingly. The Member States and stakeholders provided little information in the questionnaire on the question which codes may, in their view, be completely removed (refer vol. 4 Annex 14). On the other hand, many countries provided lists of codes which were not used in their country (questionnaire) or even provided all national amounts on the basis of six-digit codes (data request) (refer to Table 2). These information were used to determine the chapters from the LoW, which contain a high percentage of unused codes. In addition, the analysis by frequency of usage and average share from national total amounts may serve to identify specific codes which may be redundant from the viewpoint of relevance.

Table 9 shows the results of the analysis of unused codes as provided in the lists from the questionnaire and the data request. The percentage values refer to the ratio of unused codes and total available codes for each chapter.. The number of available codes is shown in the right column of the table. Shares within the country data of 50 % and more are displayed in shaded cells, the averages over all countries are marked in case of 35 % or more.

Table 9: Frequency of unused waste-codes per country and year as percentage of available number of codes - overall and by chapter

	Country (Year)														Total	
	CZ (2004)	DE (2005)	EE (2006)	EL (2004)	FI (2006)	HU (2004)	HU (2006)	IT (2004)	LT (2005/06)	LV (2006)	NL (2006)	PL (2004)	PT (2004)	SI (2004)	Average	No. of codes
01	17%	9%	74%	48%	83%	17%	30%	0%	70%	87%	22%	26%	35%	48%	**38%**	23
02	3%	8%	37%	18%	21%	8%	5%	0%	32%	26%	8%	3%	8%	8%	**13%**	38
03	11%	16%	58%	47%	5%	11%	32%	5%	42%	47%	11%	11%	0%	21%	**23%**	19
04	14%	14%	67%	52%	24%	10%	19%	0%	29%	67%	24%	10%	10%	29%	**26%**	21
05	33%	17%	92%	58%	58%	33%	46%	4%	71%	75%	25%	29%	46%	67%	**45%**	24
06	19%	13%	79%	54%	48%	21%	31%	2%	46%	75%	10%	17%	44%	46%	**36%**	48
07	21%	1%	86%	71%	31%	9%	10%	0%	71%	77%	12%	9%	36%	23%	**30%**	78
08	5%	11%	61%	53%	18%	8%	8%	0%	21%	66%	8%	5%	11%	5%	**20%**	38
09	23%	8%	54%	38%	31%	0%	15%	0%	31%	46%	8%	8%	31%	15%	**22%**	13
10	24%	17%	82%	68%	60%	40%	43%	8%	79%	84%	31%	32%	49%	53%	**45%**	173
11	11%	7%	74%	52%	19%	4%	4%	0%	56%	70%	7%	11%	30%	33%	**25%**	27
12	0%	9%	43%	30%	4%	0%	0%	0%	22%	35%	4%	4%	9%	0%	**12%**	23
13	3%	0%	35%	29%	6%	0%	9%	0%	24%	35%	12%	6%	15%	12%	**13%**	34
14	0%	0%	40%	20%	0%	0%	0%	0%	20%	20%	0%	0%	0%	0%	**7%**	5
15	0%	0%	17%	8%	0%	0%	0%	0%	0%	17%	0%	0%	0%	0%	**3%**	12
16	4%	4%	45%	34%	15%	6%	6%	0%	25%	56%	1%	1%	24%	8%	**16%**	71
17	0%	3%	29%	63%	16%	3%	0%	0%	13%	47%	0%	3%	18%	8%	**14%**	38
18	0%	6%	31%	94%	25%	6%	0%	0%	31%	31%	19%	0%	69%	6%	**23%**	16
19	22%	4%	61%	65%	40%	24%	23%	1%	52%	69%	12%	16%	44%	51%	**35%**	98
20	0%	0%	8%	45%	5%	0%	0%	0%	8%	23%	0%		8%	3%	**8%**	40
Total	**14%**	**8%**	**61%**	**54%**	**33%**	**17%**	**20%**	**2%**	**47%**	**63%**	**14%**	**19%**	**31%**	**30%**	**29%**	**839**

It can be seen in Table 9 that the issue of unused codes is clearly a matter of country size, i.e. in larger countries the shares of unused codes are generally much lower than in smaller countries. Or more precisely, the issue of unused codes depends mostly on the diversity of economic activities, leading to country totals in the bottom row that range from 2 % for Italy to more than 60 % in Estonia or Greece. However, the overall range of the averages over all available countries (second column from the right) indicates that the chapter-specific usage rates vary widely between 3 % for chapter 15 and 45 % for chapters 5 and 10. In the cases of chapters 10 and 19, the large number of available codes might be the major reason for the high shares of unused codes. Nevertheless, the number of available codes is not generally related to the usage rate. For further information, the results of the analysis by sub-chapter are presented in vol. 4 Annex 4.10.

LoW codes with low usage and/or small amounts

In the following, the codes with the lowest usage and smallest amounts are discussed on the basis of the lists presented in vol. 4 Annex 4.11 and Annex 4.12, where these codes are listed for hazardous and non-hazardous waste, respectively.

For hazardous and non-hazardous waste, the tables contain those codes that were used by less than 25 % of the countries which provided information on the usage of the codes (used by 3 countries or less).

For hazardous waste, all codes with an average value (mean AND median) of smaller $4x10^{-5}$ of the national total were filtered as amounts with the smallest amounts. The corresponding limit for non-hazardous waste was $4x10^{-6}$, because the number of codes with small amounts is much higher for non-hazardous waste (see also frequency distributions in Figure 1 and Figure 2 of chapter 0).

The resulting tables on codes with lowest usage reflect the results of the discussion above, as they contain mostly codes from chapter 10 (altogether 25 codes). It is particularly interesting that all together 11 waste types of this chapter labelled “wastes from cooling-water treatment” appear in the lists which are used by only up to three countries. In 10 cases even both available codes of mirror entries are rarely used (100409/10, 100508/09, 100609/10, 100707/08. 100819/20). (see also proposals for deletion of LoW codes in chapter. The same applies for 4 codes for “waste crack-indicating agent” with two complete mirror entries (100915/16, 101015/16). All these rarely used codes had, if available, also low average amounts of smaller 10^{-2} % of the national totals.

On the other hand, the code 100211 “wastes from cooling-water treatment containing oil” was with 0.9 % median and 7.7 % mean among the 20 codes with the overall largest amounts, and was used by 7 of 14 countries (see vol. 4 Annex 4.13). 100212 had average amounts of 0.02 % and were used by 5 of 13 countries.

Another mirror entry of low usage but with higher amounts is that for “wastes from treatment of salt slags and black drosses” (100329, 100330). The average amount for the non-hazardous code 100329 was with 0.5 % median and 2.9 % mean among the 20 codes with the largest amounts (see vol. 4 Annex 4.13).

Another interesting group of wastes listed are the three codes of single use cameras (090110/11/12). These three codes have higher usage rates (used by 4 to 6 countries) but very small amounts of less than 10^{-4} %.

Most of the remaining other codes may as well be checked on an individual basis. At least some of the hazardous wastes with very small amounts appear necessary, as the particularly dangerous nature of the substances requires separate registration. Examples of such codes include 160108 (components containing mercury), 160109 (components containing PCBs), 160110 (explosive components (e.g. air bags)), 160401 (waste ammunition), 160901 (permanganates, e.g. potassium permanganate) or 180110 (amalgam waste from dental care). Quite consequently, all of these wastes are used by a majority of the countries covered.

Missing entries

In the questionnaire survey Member States and stakeholders were asked whether additional entries in the LoW would be needed. If yes, the respondents were invited to specify the waste types for which a separate specific entry is regarded as necessary. Considering that the List of Waste with its 839 entries is already rather comprehensive the high number of proposals was astonishing.

Suggestions for new codes were made for every chapter of the LoW, except for the chapter 14. A complete list of the proposals made in the questionnaires is provided in vol. 4 Annex 13. This chapter tries to summarise the responses and to highlight some proposals that were frequently mentioned or that are considered particularly relevant for other reasons.

- Several proposals for additional codes refer to **wastes from agriculture and food preparation (chapter 02)**. Some of the proposals reflect national specificities in food production. Others have a more general character. Additional waste codes were proposed for:
    - hazardous wastes in the sections 02 01 and 02 02, e.g.
        - pesticides,
        - out-dated seeds that generally contain pesticides and should be treated in hazardous waste plants,
        - hazardous animal carcasses (so far assigned to 18 02)
    - Non-hazardous animal by-products
    - Beet pulp and beet slices
    - Whey
- Several comments address the problem that EU waste legislation establishes reporting obligations on waste types that are not adequately specified in the LoW. This concerns in particular **waste electrical and electronic equipment (WEEE)**:
    - The problem that section 16 02 should be adapted to the needs of Directive 2002/96/EC was addressed by several countries and stakeholders (e.g. by IT, BG; LT, UK, PL, WEEE-Forum, FNADE). Detailed proposals for a specification of section 16 02 were made by the WEEE-Forum and by Italy. The proposal of the WEEE-Forum which is based on the structure of a data collection tool for WEEE compliance systems is very detailed and sophisticated. The main features are presented in a separate table in vol. 4 Annex 13.2. The proposals of Italy are contained in the overview table in vol. 4 Annex 13.1.

    - The French association FNADE proposes to include more detailed codes for waste from treatment of WEEE in section 19 02.
    - Finland and Estonia have expanded the scope of section 16 02 in their national LoW-versions to equipment other than WEEE because no appropriate section or codes exist for discarded equipment not containing electronic or electrical components.
- The lack of codes for **mixed industrial and commercial waste** was addressed by several countries (UK, EE, PL, ES):
    - UK pointed out that a code for mixed waste (household and similar waste) is generally needed for each origin-based chapter because it is not consistent to allocate all this waste to the municipal waste (chapter 20)
    - Estonia has already introduced a national code in chapter 19 for mixed industrial and commercial waste that is not similar to household waste and should not be allocated to chapter 20.
    - Poland and Spain would like to have a special code in chapter 09 for mixed waste from developer and fixer of the photographic industry. It is outlined that the lack of such a code leads to burden due to correct classification according to OECD.
- Several countries (UK, IT, SI, LT) propose additional **codes for unused or expired products**, especially for chapter **07 *Wastes from organic chemical processes***:
    - UK points out that chapter 07 does not include codes for products although the heading refers to manufacture, formulation, supply and use (MFSU) of organic chemicals. UK concludes that either product codes should be inserted, or it should be ensured that appropriate codes are used from elsewhere for the products.
    - Italy proposes to introduce specific codes for unusable and expired products in each section of 07 04 (MFSU of organic plant protection products…), 07 05 (MFSU of pharmaceuticals) and 07 06 (MFSU of fats, grease, soaps, detergents, disinfectants and cosmetics).
    - Slovenia and Lithuania generally miss codes for expired products (Slovenia) and / or damaged products like food, textile etc. (Lithuania).
- Spain and the Germany (Sachsen-Anhalt) propose a specific code for the increasing amounts of wastes from biodiesel production. Sachsen-Anhalt proposes to introduce such a code in chapter 02, Spain refers to chapter 07.

- Sachsen-Anhalt also proposes:
  - a separate code for contaminated wood from construction and demolition (so far summarised under 17 02 04* together with glass and plastics)
  - a specific code for compost from sewage sludge. Such composts still have waste properties and are currently assigned to 19 08 05 '*sludges from treatment of urban waste water'* which is the main constituent of the compost.
- A very detailed and extensive proposal is made by Italy for chapter 03 *Wastes from wood processing and the production of panels and furniture, pulp, paper and cardboard*. This includes new sections and codes for:
  - waste from the polygraphic industry;
  - waste from production and/ or processing of plastic laminate and decorative panels

The further assessment is presented in volume 3 of this report.

Frequency of laboratory analyses

In part 5 of the questionnaire, the countries and stakeholders were asked to provide quantitative information on the frequency of laboratory analyses carried out in order to determine whether a waste is hazardous or not. The countries/stakeholders were asked to specify the number of analyses by waste codes and H-criteria.

The results of the survey can be summarised as follows[9]:

- None of the countries was able to provide the requested information. Information could at best be provided for individual laboratories or for specific aspects (AT, DE-SA). Reasons for the unavailability of information are:
  - Information on laboratory analyses of waste (frequency, waste type, parameter and H-criteria) is either not collected at all in the Member States, or it is at least not collected centrally.
  - Waste owners are usually not obliged to disclose the extension of the analytical characterisation of their waste.
  - Waste material is analysed not only for classification but also for other purposes (e.g. suitability for landfilling, transport regulation, quality requirements, …); which makes it difficult to obtain information that would allow drawing conclusions on the efforts of LoW-implementation.

[9] The detailed answers by country are provided in vol. 4 Annex 23.1

- In Austria, waste analysis data are transmitted to the Federal Ministry of Environment for declassification purposes in cases where a waste owner wants to demonstrate that a categorised hazardous waste is non-hazardous. For this purpose between 300 to 500 wastes are examined every year. This number does not include those wastes where the result of testing is a hazardous property. The main wastes are contaminated soils, contaminated demolition waste as well as fly ash and slags from (waste) incineration. The main H-criterion examined is H 13. Most of the waste that is generated in Austria can be assigned to the Austrian Waste list without testing.
- The German Bundesland Sachsen-Anhalt provided information on two laboratories that are carrying out waste analyses:
    - One laboratory specialising in waste analyses carried out 5,000 analyses per year of which 1,000 analyses referred to the H-criteria in general, and 100 analyses to H13 in particular.
    - Another laboratory carried out 5,500 waste analyses per year of which 2,500 concerned contaminated soil, 2,000 ashes, slag, recycling materials and other mineral materials, 200 compost, 50 sewage sludge, and 50 waste oils. The remaining 700 analyses concerned other waste types. The parameters that were analysed are not known.
- Most other countries that responded to part 5 of the questionnaire provided information on accredited laboratories but could not report any figures on the frequency of laboratory analyses (BG, EE, ES, FI, FR, HU, LV, NL, SI).

On account of the poor outcome of the survey with regard to laboratory analyses additional expert interviews on the subject were carried out. The obtained information is presented in a section which will be delivered after the expert workshop on analytical problems and the testing approach.

3 2nd questionnaire

After the answers to the first questionnaire regarding analytical problem, the classification of hazardous waste and approaches taken by the Member States to overcome these problems have not been seen as sufficient to develop policy options a second questionnaire was sent out to the Member States.

Major question was:

Which are according to your experience the most serious classification problems with regard to analytical aspects, test methods or problems with limit values for specific substances, substance classes or waste types?

> Please describe the problems and the concerned waste codes or substances, substance classes or waste types. Sort the problems according to their relevance starting with the most serious one.
>
> Specify the extent and the possible impact of the listed classification problems (e.g. frequency of the problem, burden to companies / administration, possible environmental impacts through misclassification, etc.)
>
> Describe how the listed problems are handled in practice.

The complete questionnaire and the answers received are shown in the vol. 4 Annex 23 to this report.

14 answers were received; two answers were received from two Member States each. Major problem which has been stressed by several answerers are efforts for characterisation of wastes that contain hazardous metal compounds and waste that contain multiple organic substances (and/or unknown organic substances). Missing standards for waste analysis and missing guidance on test methods respectively guidance for classification has been the second major issue expressed in the answers to the questionnaire. Regarding specific substances organic substances from pyrolysis, hydrocarbons, and road construction material containing tar has been mentioned as most important. Especially regarding heterogeneous waste practicable and standardised approaches for sampling and the definition of population, sub-population and scale has been mentioned.

In addition it was asked:

"When a waste is characterised as hazardous it gets a waste code which is marked with an asterisk. The property which renders the waste hazardous (the specific H-criterion) is not communicated via the waste code in most of the cases. However, in some countries the information about the relevant H-criterion is communicated via additional documents which are sent together with the waste to the waste management installations (e.g. based on Article 5 of the Hazardous Waste Directive[10] in conjunction with Section A of Annex I to Council Directive 84/631/EEC[11]).

Does a document accompany hazardous wastes in your country, which shows the relevant H-criterion/criteria for the waste?"

6 Member States answered that they use such documents, 7 that they don't (no answers from 14 Member States).

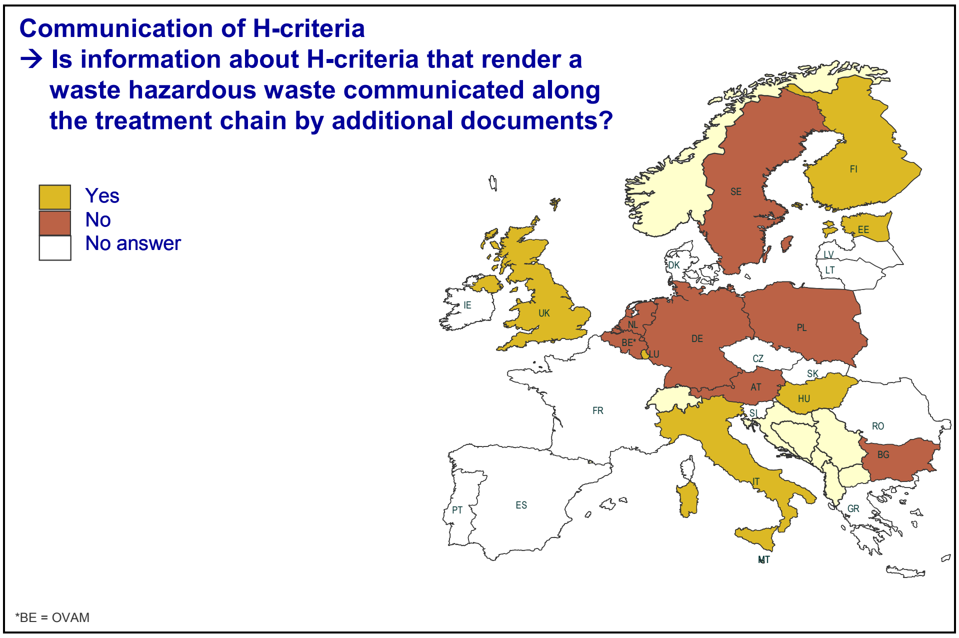

Figure 3: Communication of H-criteria in Member States

[10] Where hazardous waste is transferred, it shall be accompanied by an identification form containing the details specified in Section A of Annex I to Council Directive 84/631/EEC of 6 December 1984 on the supervision and control within the European Community of the transfrontier shipment of hazardous waste (1), as last amended by Directive 86/279/EEC.

[11] ANNEX I to Council Directive 84/631/EEC of 6 December 1984 on the supervision and control within the European Community of the transfrontier shipment of hazardous waste
17. Nature of the risk: Explosive / Reactive / Corrosive / Toxic / Flammable / Other
18. Outward appearance of the waste at . . . °C: Powdery or Pulverulent / Solid / Viscous or Syrupy / Sludgy / Liquid / Gaseous / Other

4 Summary and Conclusions

The conducted surveys showed that the majority of Member States transposed the LoW into national legislation without changes. Modifications are reported by 5 out of the 20 Member States covered by the survey. The national modifications include the introduction of additional waste codes and the modification of existing entries, the adaptation of limit values for hazard criteria, and in one case the modification of the classification procedure.

However, it is important to note that the literal transposition of Decision 2000/532/EC is not sufficient to safeguard a harmonised application of the list. The harmonised application depends on several other factors like the monitoring and enforcement established in the Member States and the provided guidance on LoW application.

The necessity and importance of guidance for the correct and harmonised application of the LoW is acknowledged by most countries. Several Member States indicated that the publication of a European guidance document would be welcomed.

Guidance documents and tools on the LoW application are published in at least ten of the Member States that responded to the survey. The guidance documents are published mainly by the environmental authorities. Target groups are the competent authorities themselves, waste generators and waste management companies. The provided documents differ greatly with regard to approach and depth of guidance.

The LoW is established in the EU as the main classification not only for administrative purposes but also for waste statistics. The reason for the frequent use of the LoW for statistics is not necessarily its suitability for statistical purposes but rather the fact that it is well established and has to be used for administrative purposes anyway.

The answers to the questionnaires indicate that there is a goal conflict between the request to have a less extensive waste list on the one hand and the wish to have specific entries for every waste type. The situation can be characterised as follows:

- Although the LoW with its 839 waste codes is already quite extensive the lack of specific entries in the LoW is considered as one of the main classification problems by several Member States. The frequent use of 99-codes in some countries could be seen as a result of missing entries. However, it could also be interpreted as an inadequate application of the LoW-classification procedure. Altogether, the Member States proposed about 300 additional specific waste codes in their responses to the survey.
- On the other hand, the statistical evaluation has shown that a significant number of waste codes exist that represent only a very small share of the

generated waste and/or are used in a few Member States only. This indicates that some waste codes are overly specific and probably dispensable. The potential for the deletion of individual waste codes is further assessed under task 3 of the study on the basis of the collected data.

The main classification problems mentioned by the Member States can be summarised as follows:

- Problems resulting from the structure of the LoW and the classification procedure;
- Problems concerning the classification of hazardous waste and the application of mirror entries;
- Problems resulting from the lack of suitable waste codes;
- Ambiguous classification on account of two or more possible codes;
- Problems resulting from unclear or imprecise definitions.

The main objective of task 1 was to provide data and information for the conduction of the tasks 2 concerning the link between LoW and chemicals legislation and of task 3 on the review of structure and entries of the LoW. The respective results and conclusions are therefore integral part of the volume 2 and 3 and are not repeated here. Please refer to the respective parts of the study:

- The outcome of the questionnaire survey and of the analysis of guidance documents on the application of the hazard criteria in Member States is integrated in chapter 6.2.2 on the detailing of selected H-criteria in volume 2 of the report.
- The statistical data compiled under task 1 are used as basis for the analysis of impacts of new and amended hazard classes and hazard categories in volume 2, chapter 7.
- Statistical data and survey results of task 1 were used for the development of proposals for new LoW codes and for the amendment or deletion of existing ones in volume 3, chapter 4.5.3.

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Review of the
European List of Waste

Final Report

Volume II

Link between LoW and chemicals legislation

November 2008

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1 Problem description and rationale for an amendment

At UN-level, a harmonised set of rules for classification and labelling of substances and mixtures has been developed (Globally Harmonised System GHS). The GHS is a recommendation and consists of so called building blocks, which can be adopted as they are or modified by the implementing countries.

The EU plans to implement the GHS as a regulation (CLP Regulation). The present status in the legislative process is that the European Parliament adopted a compromise package on 3 September 2008[1]. The Council approval in the 1st reading took place on November 28th 2008. Publication of the adopted acts in the Official Journal is foreseen for late 2008.

The major general changes introduced by the CLP in comparison to the existing classification and labelling rules regard the methods and criteria for determining physico-chemical hazards, some human health end-points and the application of rules for using non-test data.

Specific differences between DSD/DPD and CLP in the context of the LoW review are, inter alia, that a different number of substances will be covered by the CLP classifications (which has consequences for mixtures as well), when references in the LoW are shifted from DSD/DPD to CLP. The differences can be illustrated by the example of health hazards as shown in [EC 2006][2]:

- Both the DSD/DPD system and the GHS take account of different routes of uptake, i.e. oral, dermal and inhalation.
- In the GHS, the LD_{50} / LC_{50} ranges of the individual categories do not always coincide with the ranges of the corresponding EU categories of danger. For example, the current EU category Very Toxic (T+) for the oral route of uptake ranges from $0 < LD_{50} > 25$ mg/kg, while GHS category 1 ranges from $0 < LD_{50} > 5$ mg/kg and category 2 from $5 < LD_{50} > 50$ mg/kg. The EU category Toxic (T) ranges from $25 < LD_{50} > 200$ mg/kg for the oral route while GHS category 3 ranges from $50 < LD_{50} > 300$ mg/kg.

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[1] Chemicals: classification, labelling and packaging of substances and mixtures (amend. Directive 67/548/EEC and Regulation (EC) No 1907/2006)

[2] Basic information related to health hazards is provided by the documents European Commission: Technical Assistance to the European Commission on the Implementation of the GHS (Ökopol, 2004) http://europa.eu.int/comm/enterprise/reach/ghs_en.htm, DG ENTR, Comparison between EU and GHS Criteria, Human Health and Environment, June 2005 http://europa.eu.int/comm/enterprise/reach/docs/ghs/ghs_comparison_classifications.pdf

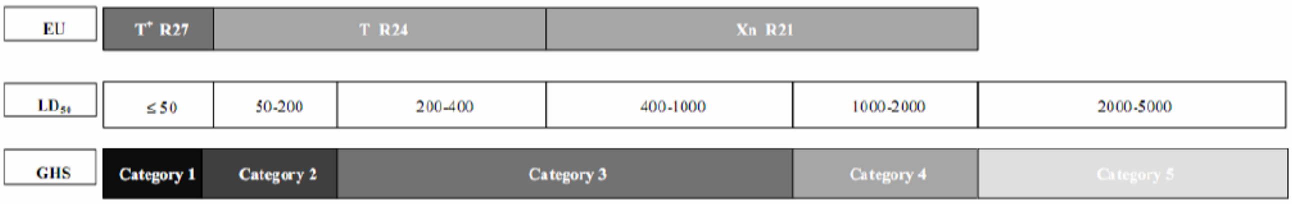

Figure 1: Category ranges for acute oral toxicity under EU legislation and the GHS

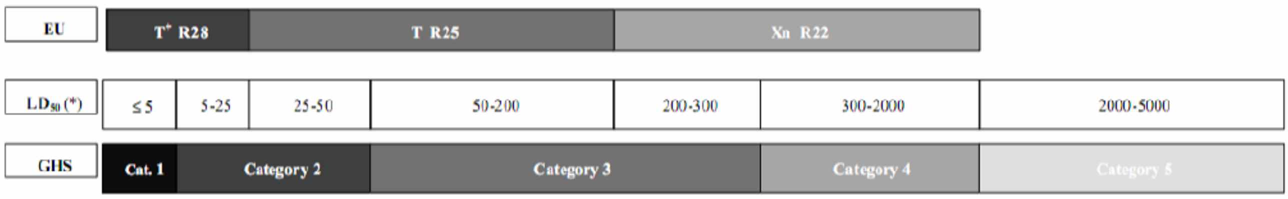

Figure 2: Category ranges for acute dermal toxicity under EU legislation and the GHS

Adaptation need relates, inter alia, to the link between H-criteria and R-phrases (DSD), which will not exist under the CLP-regulation. The classification according to the CLP will comprise the naming of a hazard class and a signal word. So called hazard statements will be used to communicate the dangers of a substance or mixture. These will not be part of the classification but only the labelling.

Annex V of the DSD is repealed by REACH. REACH refers to Test Method Regulation (EC) 440/2008 instead which has taken over all test methods from the Annex V DSD. Hence, the link from waste legislation - and the H-criteria - to the testing methods has to be updated.

2 Background - Classification of substances and mixtures in chemicals legislation

2.1 Main principles of classification

Classification of chemicals is a standardised way to characterise the inherent hazardous properties of a chemical. Three areas of hazards are distinguished: physical-chemical hazards, hazards to human health and hazards to the environment. For human health hazards the pathways (inhalation, oral and dermal uptake) upon which the chemical could cause an adverse effect are specified. Most hazards are distinguished with regard to the level of severity of the effect (e.g. very toxic, toxic or harmful).

The classification of a substance is determined by comparing results from testing with the criteria for the respective hazardous property. The classification of mixtures can be determined either by testing the mixture as a whole, which is necessary for most physico-chemical properties or by assessing the hazardous properties of the substances in the mixture and applying calculation rules to deduce the classification. A third approach is to use epidemiological data.

The classification and labelling of chemicals is strictly hazard-based. It is determined without consideration of any exposure of humans or the environment. This means that the classification describes the potential of a chemical to cause damage. Whether or not and in which dosage a chemical comes into contact with humans or the environment (exposure) determines which damage is actually caused. If a substance or a mixture is classified for any of the hazardous properties defined in the CLP Regulation, it is called ‘hazardous’ substance or mixture.

The CLP Regulation which is planned to enter into force by the end of 2008 will introduce some changes to the current classification and labelling rules for chemicals. It is similar to the DSD and DPD e.g. regarding the following aspects:

- “It provides one single system for hazard classification and labelling.
- It covers approximately the same hazards.
- It often uses similar or equal classification criteria.
- It sets up an equivalent system of hazard communication.

CLP is different to the current directives:

- It sets criteria for both transport and supply and use
- It defines further hazard classes and categories
- It uses partly other criteria and other cut-offs
- It uses a different approach for mixtures
- It changes some labelling elements

GHS includes some categories which are not part of the current EU system. CLP does not carry over those categories:

- Flammable liquids category 4
- Acute Toxicity category 5
- Skin corrosion/irritation category 3
- Aspiration hazard category 2
- Acute aquatic toxicity category 2
- Acute aquatic toxicity category 3"

[Klauk pers.com. Oct. 2008]

It takes over the current Annex I of DSD and Title XI (Classification and Labelling Inventory) of the REACH Regulation. The CLP Regulation maintains the current level of protection by including EU "left-overs" not yet covered by the GHS

- Ozone depletion (Annex I Part 5)
- Additional labelling requirements in Annex II, e.g.
- EUH014 [R14] "reacts violently with water"
- EUH066 [R66] "repeated exposure may cause skin dryness or cracking"

2.2 Communication of dangerous properties

The classification of a substance or mixture is to be communicated on the label of a chemical (and its packaging) and with the safety data sheet.

The classification on the label is abbreviated and supplied together with a hazard symbol, alerting on the specific hazard. The label is to ensure that the person handling the chemical is informed of any hazard in a concise way. There are several rules on how much information should be supplied and in which sequence and format.

The safety data sheet is required for any substance or mixture placed on the market that is classified as hazardous or that is a substance of very high concern or that contains such substances in relevant amounts (REACH Article 31). Apart from the classification information, the safety data sheet contains several other information for appropriate protection of workers and the environment, such as specific advice on safe handling and storage or on risk management measures, as well as further legal information. If an exposure scenario according to the REACH requirements for dangerous substances manufactured or imported in amounts of ≥ 10 t/a is attached to the safety data sheet, more specific information on how to use a substance or mixture is included therein.

2.3 Links related to the classification procedure of mixtures and waste

Waste is a mix of various substances and is thus in principle similar to a mixture. Whereas a mixture is intentionally produced and its composition is known to its producer, waste is frequently the result of a process where a chemical has been used …

- … and remnants of that chemical remain in its packaging or in the equipment with which it has been applied (e.g. remaining paints in paint containers and spray pistons) → the composition of the waste is almost[3] the same as that of the paint and the classification of the waste can be derived from the classification of the mixture directly.
- … as processing aid (e.g. lubricants) → the composition of the resulting waste is not the same as the original chemical as new (unknown) substances (may) have contaminated the original chemical. The classification of the waste would be based on the classification of the original mixture but contamination has to be considered.
- … to become part of an article → the classification or content of chemicals in articles is normally not communicated and the one producing waste (disposing of the article) has no respective information[4]. The classification of waste cannot be based on information on the input materials but has to be derived by other means (e.g. identification of substances in the article likely to trigger the application of an H-criterion).

Considering waste as a special 'mixture' would imply that the same rules for classification would apply.

In the following the similarities and differences in the classification of chemicals and wastes is further analysed.

2.4 Comparison of classification of wastes and of chemicals

According to the LoW, wastes are to be classified as hazardous, if they display any of the criteria in Annex III of the revised WFD and, if for the criteria H3 to H8, H10 and H11 the specified conditions are met. These criteria are analogous to those defined as 'dangerous properties[5]' in the DSD (67/548/EEC) and the respective criteria of Annex VI of the DSD are to be applied. Furthermore, reference is made to the respective tests needed to determine whether or not the criteria are fulfilled. Waste can be classified either based on knowledge of its composition or based on testing, just as it is the case for preparations.

The assessment of waste should consider the different exposure routes (inhalation, ingestion and penetration of skin are listed in the definition of the H-criteria) but the final classification only specifies the H-criterion. The classification of a chemical indicates the type of effect and,

[3] volatile substances would have evaporated and thus would not or at much lower concentrations be present in the waste and cleaning agents may be added if equipment is cleaned

[4] An exemption from this general issue is e.g. the disposal of end of life vehicles, where the ELV Directive requires that producers have to inform the treatment operators and disposal companies about the presence (and the location) of „restricted substances". Similar provisions exist in the WEEE-/RoHS Directive.

[5] The property of sensitisation is the only type of property contained in Directive 67/548/EEC, which does not occur as H-criterion in the hazardous waste directive

for some categories of danger, the relevant exposure route. It also distinguishes different levels of danger and indicates whether prolonged exposure or long term health effects have to be expected. Hence, the classification and labelling of substances and mixtures is more complex and has been summarised and aggregated for the purpose of classifying wastes.

In most cases the definition of the H-criteria is either identical to the respective definition of a dangerous property in the DSD or it is worded in a way to fit to the test method underlying the identification of a dangerous property of a substance/ preparation. In the following cases, the H-criteria include two or three levels of danger as defined in the DSD:

- Extremely explosive (R3) and explosive substances (R2) are covered in H-criterion 1. The classification of the substance does differentiate by means of two different R-phrases, whereas the danger symbol would not distinguish between the different levels of explosiveness
- Extremely flammable (R 12) and highly flammable (R11) are covered in H-criterion H3-A. Also R15 - contact with water liberates extremely flammable gases and R17 - spontaneously flammable with air are covered under this criterion. On a chemical's label, the three levels of flammability would be shown differently (F+ and flame, F and flame and no danger symbol)
- Very toxic (R26, R27, R28, R39), toxic (R23, R24, R25, R48) and harmful are covered both by the H-criterion toxic. On a chemical's label, they would be distinguished (T+ and skull; T and skull).
- The H-criterion 14 – ecotoxic – covers acute and chronic toxicity in the aquatic and terrestrial environment. Directive 67/548/EEC contains several R-phrases which indicate different types of environmental risks.

2.5 Classification process

Both waste and substances / mixtures can be classified on two (alternative) routes: either they are tested as a whole and the test result is compared to the definition of the criterion for hazardousness or the fulfilment of the criterion is 'calculated' based on the knowledge of the dangerous and concentrations of the components (conventional method). A third way to derive the classification would be to use epidemiological data.

For the classification of mixtures with regard to physico-chemical properties, testing is the preferred route and the conventional method is only applicable to exclude the classification as explosive, flammable or oxidising under certain circumstances. In contrast to that, for human health hazards, testing of the mixture should only be used, when the conventional method is found to be over- or underestimating dangers or where other evidence suggests that testing is the more appropriate classification method.

2.5.1 Testing

The revised WFD makes reference to Annex V of the DSD with regard to test methods. Thus, the same tests are to be applied as for substances and mixtures. In many cases it is questionable, whether this is possible, as waste may have properties which disable testing.

For many wastes, the composition will be unknown and therefore testing will be the only means to obtain information on its hazards. It is therefore essential that in particular the methods for taking samples and processing the waste to a state, where it can be applied in any test method are designed in a way that they deliver reliable results.

2.5.2 Conventional method

The hazardous properties of mixtures, in particular for human health hazards, with the exception of the properties carcinogenicity, mutagenicity and reprotoxicity, are to be determined by the so called ‘conventional method’. In principle, the concentrations of all substances which contribute to a certain hazard class are divided by the threshold value above which they trigger the respective classification, and are summed up. If different substances contribute to the same type of hazard but are classified more strictly, these substances are taken into account for the identification of the less hazardous end-point. For example, substances which are corrosive are considered in determining whether the concentration limit for irritation is exceeded and substances which are very toxic are considered in determining the properties toxic or harmful. The generic concentration limits for the respective end-points are used in the calculation. If the sum of substances contributing to a hazard exceeds 1, then also the mixture is to be classified for that hazardous property. If substances representing different hazard levels of a certain effect and are contained in a mixture, they are also added up.

$$\sum\left(\frac{P}{L}\right) \geq 1$$

P are the concentrations of each substance contributing to the hazard and
L is the lower concentration limit of that substance for that hazard.

Figure 3: Calculation within conventional method (example)

If the effects of substances are not regarded as additive (CMRs and substances with R39 or R48, which indicate either long term effects or effects due to prolonged or repeated exposures), then the concentrations of the individual substances is not summed up. The values for L are either generic ones or they are individual and listed in Annex I. The specific concentration limits are usually lower than the generic ones. This results in an increase of the relevance of these substances in the classification of the mixtures.

The classification of wastes according to the LoW criteria is carried out in analogy since note 2 of Annex III of the revised WFD refers to Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations[6].

Cut-off limits are defined for considering substances in classifying mixtures. These depend on the level of hazard of the substance and are either 0.1% or 1% (w/w) for liquid mixtures and 0.02%, 0.2% or 0.1% (vol/vol) for gaseous mixtures.

2.5.3 Classification criteria

In the following table, the classification criteria under revised WFD and LoW and in the DPD are compared. Due to the fact that some hazard classes are aggregated in the H-criteria, some categories contain more than one set of R-phrases.

- In the **first column** the H-criteria are listed, which have a corresponding definition under the DPD.
- In the **second column**, the pertaining R-phrases are listed (for the three exposure routes, the concentration limits triggering classification don't differ).
- The **third column** shows details of the H-criteria of the revised WFD as provided in the LoW.
- The **fourth column** shows the generic concentration thresholds triggering classification of a mixture if one or more substances with the respective R-phrase in the same hazard level are contained. E.g. if a substance classified with R28 is contained in a mixture above 7%, then this concentration leads to the same classification as shown in column three for the LoW.
- In the **fifth column** the thresholds are listed which would trigger a classification of the mixture at all. If e.g. the same substance was contained in a concentration of 0.2%, the mixture would still be classified as dangerous, because it fulfils the criteria of being harmful.

Differences between the thresholds in the DPD and in the CLP Regulation are indicated (if the values are the same, no information on CLP is included). For further details on generic limit values of CLP refer to chapter 6.2.3 of this report.

[6] The footnote to this reference further clarifies: OJ L 200, 30.7.1999, p. 1. Directive as last amended by Regulation (EC) No 1907/2006 (OJ L 396, 30.12.2006, p. 1. Corrected version in OJ L 136, 29.5.2007, p. 3). The "old" WFD referred to Directive 88/379/EWG. Directive 1999/45/EC and the additivity principle was not part of the provisions of the LoW and WFD.

Table 1: Classification criteria under LoW and DPD

H - criterion	67/548/EEC R-phrases	Criteria LoW in addition to revised WFD	Concentration leading to same classification	Concentration leading to 'dangerous' in lowest classification	Exemptions mixtures
H1, Explosive	R2 - risk of explosion, R3 - extreme risk of explosion	None	As for substances (testing)	As for substances (testing)	No components classified, composition changes
H2, Oxidizing'	R7 - may cause fire, R8 - Contact with combustible material may cause fire, R9 - explosive when mixed with combustible material	None	As for substances (testing)	As for substances (testing)	No components classified composition changes. Peroxides always oxidising, mixtures: concentration values
H3-A, Highly, flammable	R12 - extremely flammable , R11 - highly flammable , R15 - contact with water liberates extremely flammable gases, R17 - spontaneously flammable with air	FP ≤ 55	As for substances (testing)	As for substances (testing)	No components classified respectively, composition changes borders
H3-B, Flammable	R10 - flammable	FP ≤ 55	As for substances (testing)	As for substances (testing)	No components classified, composition changes
H4, Irritant	R38 irritant to skin – inflammation, R36 irritant to eyes, R41 serious damage to eyes	R41: 10% , R36, R37, R38: 20%	R41: 10% , R36, R37, R38: 20%	**R41: 5%,** R36, R37, R38: 20% **CLP: 10%**	
H5, harmful	R20, R21, R22 harmful	R20, R21, R22 ≥ 25%	R20, R21, R22 ≥ 25%	Harmful --> Harmful: ≥ 25%	
H6 , Toxic	R26, R27, R28, R39 very toxic , R23, R24, R25, R48 toxic	R26, R27, R28 ≥ 0.1% R23, R24, R25 ≥ 3%	**R26, R27, R28: ≥ 7%,** R23, R24, R25: ≥25%	Very toxic --> harmful: ≥0.1, Toxic --> harmful ≥3	
H7 , Carcinogenic	R45, R49 (Cat 1+2), R40 (Cat 3)	Cat 1 and 2 ≥ 0.1%, Cat 3 ≥ 1%	Cat 1 and 2 ≥ 0.1%, Cat 3 ≥ 1%		non additive effect --> individual concentrations
H8, Corrosive	R34 causes burns, R35 causes severe burns	R35 ≥ 1% R34 ≥ 5%	**R34 and R35 --> 10%** **CLP: 1 and 5%**	R35: 1% , R34: 5%	
H10 , reprotoxic	R60, R61 (Cat 1 + 2, R62, R63 (Cat 3)	Cat 1 and 2 ≥ 0.5% , Cat 3 ≥ 5%	Cat 1 and 2 ≥ 0.5 %, **CLP: Cat 1: 0.3%** Cat 3 ≥ 5% **CLP: Cat 2[7] 3%**		non additive effect --> individual concentrations
H11, Mutagenic	R46 (Cat 1 + 2), R68 (Cat 3)	Cat 1 and 2 ≥ 0.1%, Cat 3 ≥ 1%	Cat 1 and 2 ≥ 0.1%, Cat 3 ≥ 1%		non additive effect --> individual concentrations
H14, Ecotoxic[8]	R50, R51, R52, R53	None	All R-phrases: ≥ 25%	2.5[9]%	

[7] In the CLP system, the categories are numbered differently. Category 2 in the CLP equals Category 3 in the current classification system.

[8] Only the R-phrases to classify aquatic toxicity are considered relevant. A more detailed assessment is made in the Chapter discussing H14.

[9] For substances with LC_{50} or EC_{50} values below 1 mg/l, this factor is reduced. In the amendment of the preparations directive in 2006, a factor 10 is to be applied (i.e. if LC_{50} = 0.1 mg/l, the concentration limit is 0.25%, if the LC_{50} is 0.01 mg/l the concentration limit is 0.025%)

The comparison of concentration thresholds shows differences for the property damage to eyes (R41). There is a concentration range (5% for R41 and app. 9.9%), where the classification as 'dangerous in principle' would be different for waste and a chemicals preparation.

For the properties R26: Very toxic by inhalation, R27: Very toxic in contact with skin and R28: Very toxic if swallowed differences can be observed regarding concentrations leading to same classification (relevant H-criterion: H4).

Regarding properties R34: Causes burns and R35: Causes severe burns CLP reflects the same values as the LoW (H-criterion H8). Regarding H10 CLP concentration values are lower than the values in the DSD.

3 Background - REACH requirements and information flows

This section summarises the REACH information and communication requirements which have consequences for the knowledge about the composition of wastes and hence the assignment of wastes to an entry of the LoW.

3.1 The waste life stage of substances under REACH

Duties under REACH related to the CSA

Waste as defined in the Waste Framework Directive 2006/12/EC is *not a substance, preparation or article under REACH* (REACH Article 2(4)). Thus, players handling substances in waste are neither downstream users nor recipients of articles, and consequently they do not have duties under REACH.

Nevertheless manufacturers and importers (M/I) of substances, downstream users (DU) and eventually recipients of articles have a number of duties under REACH related to waste.

- M/I shall document in the registration dossier available information on the amount of waste resulting from manufacture of the substance, from the identified uses and the subsequent service life in articles, including composition of the waste streams.
- For dangerous substances > 10 t/a, waste resulting from manufacture and use of the substance must to be covered in M/I's chemical safety assessment (see Annex I of REACH). This includes exposure estimation, and measures for safe handling to be communicated downstream with the exposure scenarios (ES) and in chapter 13 of the extended safety data sheet (see REACH Annex II).

Consequently, it is the duty of downstream users i) to consider the waste life-stage related information received with the exposure scenario, ii) to take action in case the internal handling of waste and the chosen route for disposal is outside the conditions set in the ES, and iii) to communicate the relevant information to further downstream users.. The tasks for M/I and DU under REACH with regard to handling of waste are:

- Implement waste related measures with regard to M/I's or DU's own activity, as stated in the exposure scenario,
- Forward waste related information received with the ES from the supplier to the next downstream user,
- Choose external waste treatment operations, in line with what is recommended in the supplier's exposure scenario.

Figure Figure 4 illustrates the scope of the waste related considerations in the CSA and the information mechanisms in the supply chain. The “Guidance on information requirements and chemical safety assessment – Chapter R.18: Estimation of exposure from waste life stage”[10] suggests the following clarifications:

Internal handling of substances in waste: the DU is still responsible to apply the OC and RMM identified in the exposure scenario, although the waste regime may already apply. This relates for example to occupational and environmental measures to prevent exposure from internal collection and storage of waste, and onsite pre-treatment of residues, for example by extracting water. The DU is also responsible to send the waste to appropriate waste treatment as identified in the ES and in line with waste management legislation. The duties of the DU under REACH end, when the residues have been transferred into the responsibility of an authorised waste management company.

Cleaning and regeneration of empty/contaminated/used processing aids or product aids (e.g. re-distillation of cleaners, washing of cleaning wipes) outside waste legislation is regarded a down-stream use under REACH. Such operations will not be covered in this section.

Residues that may occur in onsite pre-treatment of waste-water and exhaust air (= result of environmental risk management measures) and which are to be disposed of in waste treatment facilities are to be covered in the waste management section of the relevant exposure scenarios.

10 ECHA, July 2008

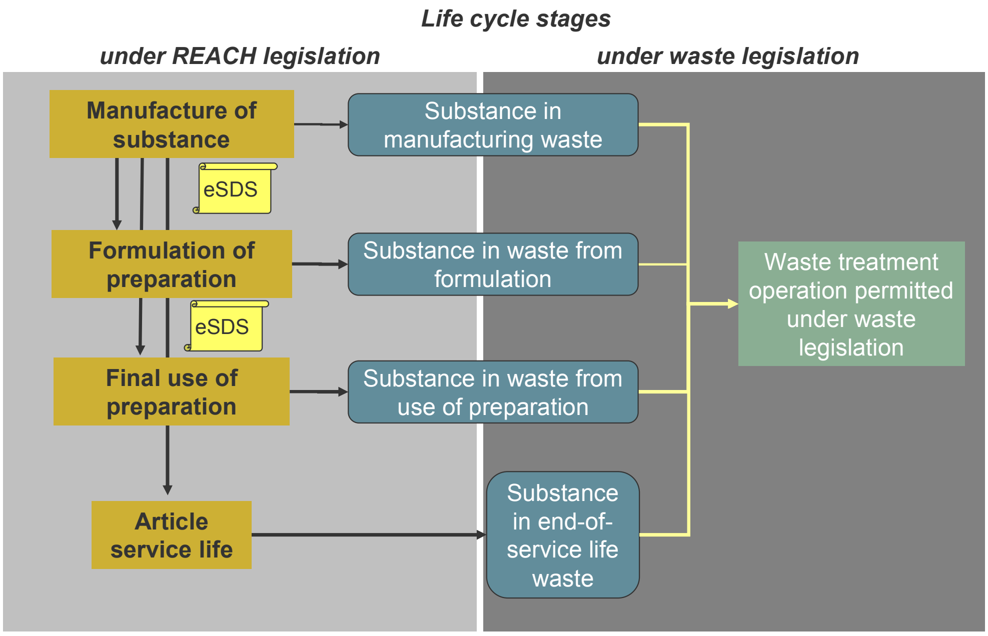

Figure 4: Interface between REACH and waste legislation

Duties under REACH related to Safety Data Sheets (Annex II)

Annex II of REACH sets out the following requirements related to section 13 of the safety data sheet:

- If the disposal of the substance or preparation (surplus or waste resulting from the foreseeable use) presents a danger[11], a description of these residues and information on their safe handling shall be given.
- Specify the appropriate methods of disposal of both the substance or preparation and any contaminated packaging (incineration, recycling, land filling, etc.)[12]
- Where a Chemical Safety Report is required, information on waste management measures that adequately control exposure of humans and the environment to the substance shall be consistent with the exposure scenarios set out in the annex to the Safety Data Sheet.

Whether or not the disposal of a substance or preparation presents a danger needs to be assessed by i) the manufacturer or importer of a dangerous substance > 10 t/a in his CSA and/or ii) by any downstream user placing a substance or preparation on the market and being required to provide a safety data sheet.

11 due to the intrinsic hazards of the waste

12 Type of disposal operation according to Annex II to the EU Waste Framework Directive

If none of the appropriate methods of disposal specified in section 13 of the SDS (or the ES annex) is available to the DU (respectively the waste management companies contracted by the DU), the DU will be required to carry out an own CSA. This CSA would be targeted to the disposal of waste resulting from the use of the respective dangerous chemical covered in the SDS. The CSA should demonstrate that the waste disposal method applied to that waste ensures control of risk for the respective substance in the waste.

3.2 LoW and the REACH information mechanisms

M/I include advice on safe disposal of waste containing his substance into the extended safety data sheets communicated down the supply chain. This advice is based on exposure assessment and risk characterisation for the waste life stage, and may include recommendations on appropriate waste codes and disposal routes for any waste containing the substance (if dangerous and > 10 t/a).

At the same time all companies generating waste are required to assign an entry from the LoW to their waste and to assess whether the waste is to be disposed of as hazardous waste or not. Thus M/Is advice (based on exposure assessment and risk characterisation) and the waste generator's assessment (based on H criteria and LoW) have to be linked to each other at downstream user level. Both assessments may complement each other in practice, assumed sufficient communication mechanisms in the chain can be set up

Figure 5 illustrates the link between the top-down assessment by M/I under REACH and the classification of waste under waste legislation.

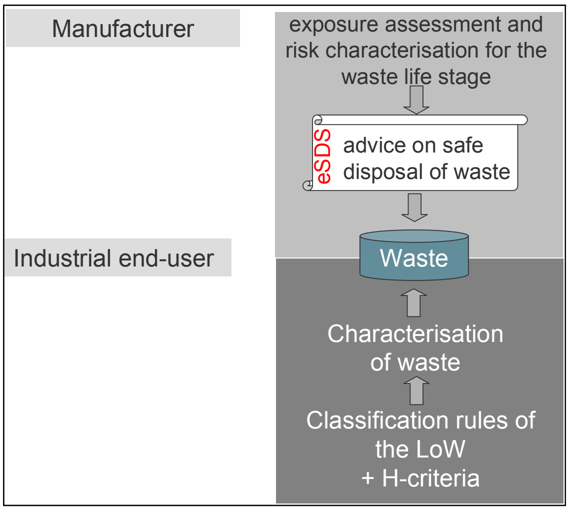

Figure 5: Interaction between REACH information and assignment of LoW codes

3.3 REACH and the entries of the LoW

REACH is focussing on individual substances. The ES focuses on the risk characteristics of the substance. The information and communication procedures and requirements of REACH and the content of the ES concern the wastes of the LoW differently:

- Sections of the LoW that focus on waste from the MFSU of substances or preparations often are quite close to the focus of the ES:

  Example

  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

- REACH and the ES include sometimes waste from off gas abatement or waste water cleaning[13]. The characteristic of wastes from those activities is in some cases relatively close to the original preparations (e.g. paint overspray captured in evacuation systems). In several cases waste from off gas cleaning is not so much influenced by the characteristics of the produced substance or preparation but by the process and by pollutants which are not produced intentionally (e.g. in case of thermal processes).
- Waste from waste management activities is not covered by REACH.
- Complex wastes from end users like end-of-service-life products and articles will not be characterised sufficiently from REACH activities (e.g. because the products are often very complex like e.g. WEEE and no communication mechanism is established from M/I to post consumer waste stage).

Overall, around one third of the entries of the LoW are entries that might be affected from REACH in the described way. 15% of the entries are related to waste from production processes not covered by the REACH procedures. 15% of the entries describe waste from off gas and waste water treatment (on site and off site). 15% of the entries are entries for waste from waste management activities (predominantly off site) (see also figure below).

[13] "Residues that may occur in onsite pre-treatment of waste-water and exhaust air (= result of environmental risk management measures) and which are to be disposed of in waste treatment facilities are to be covered in the waste management section of the relevant exposure scenarios." Guidance on information requirements and chemical safety assessment – Chapter R.18: Estimation of exposure from waste life stage ECHA July 2008

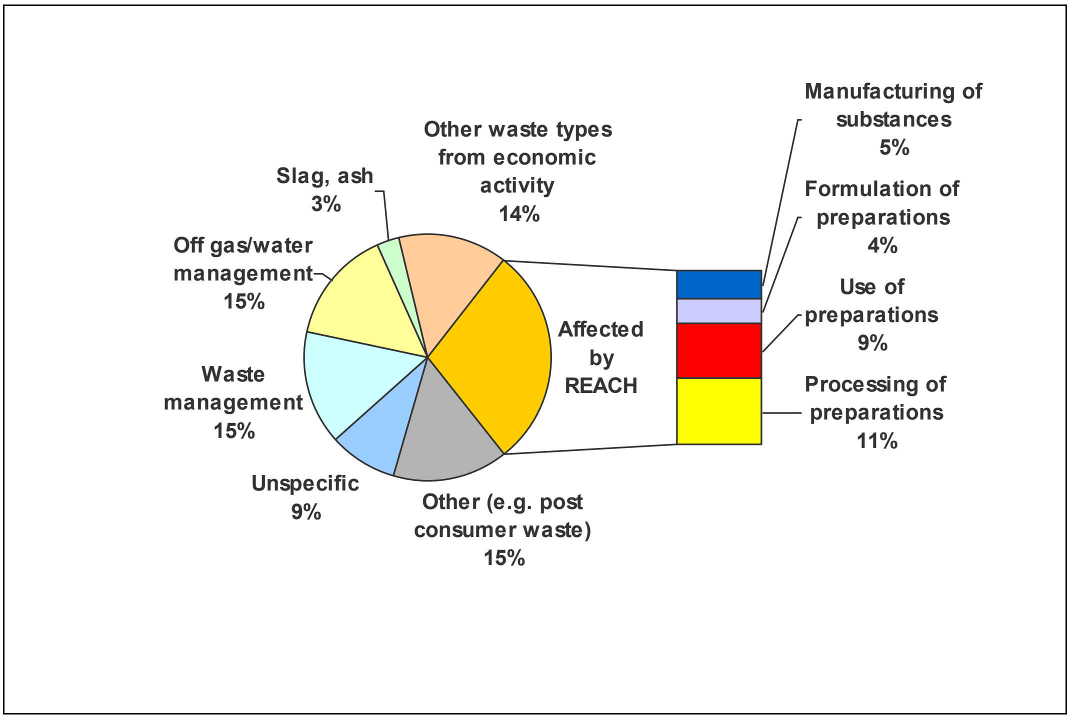

Figure 6: Link between LoW entries and waste origin (basis: number of entries)

The new information and communication mechanism established under REACH will be taken into account in the generic waste characterisation strategy in chapter 6.2.6.3 and in the volume 3 of this report about the review of individual entries of the LoW and its structure.

4 The approach

This volume of the report on the review of the European List of Waste elaborates and analyses option on how to link the new chemicals legislation with the LoW. Two scenarios have been developed. Each scenario groups a number of individual measures which cover

- the design of the general link between chemicals legislation and LoW; This includes in scenario 2 the further detailing of the H-criteria H9, H12, H13 and H14 (TOR 3.2.1)
- generic concentration limits (TOR 3.2.2.3)
- specific concentration limits including waste specific concentration limits where applicable (TOR 3.2.2.2)
- testing and improving of classification of wastes containing specific substances (TOR 3.2.3 and 3.2.2.1)

Based on the European Commission's impact assessment guidelines the analysis comprising the following four steps was adopted:

1. identifying which impact categories (from those included in the Impact Assessment Guidelines) are expected to be relevant to the scenarios for improving the operation of the LoW;
2. screening the impacts to identify those that may apply to each stakeholder group (business, consumers, public authorities and the environment);
3. describing the impacts of each scenario and
4. providing analysis of the impacts.

A qualitative assessment has been undertaken where no data are available to quantify the impacts.

5 Identification of priority impact categories

By screening the potential impacts of the measures on different stakeholder groups, the following impact categories have been identified as being relevant to the analysis (for details on impact categories see vol. 4 Annex 17 to this report):

1) Economic impacts: Priority economic impact categories for the analysis are competitiveness, trade and investment flows, operating costs and conduct of business as well as administrative costs on businesses and public authorities. Little relevance is seen for the categories competition in the internal market, specific regions, consumer and households. No relevance can be appraised for the categories property rights, third countries, international relations, innovation and research and macroeconomic environment.

2) Environmental impacts: Priority environmental impact categories for the analysis are air, soil and water quality, environmental risks and animal health. Less relevance is seen for the impact categories food and feed safety (as far as not covered by the category "soil quality") and renewable or non-renewable resources. No relevance is seen for the categories climate, use of energy, landscapes, land use, mobility (transport modes). biodiversity, flora and fauna.

3) Social impacts: Priority impact category for the analysis is occupational health and safety. It is covered in this analysis in the section about environmental impacts. Categories with minor or without relevance are expected to be employment and labour markets (as far as not already covered by the priority economic impact categories), standards and rights related to job quality, social inclusion and protection of particular groups, equality of treatment and opportunities, good administration, non-discrimination, private and family life, personal data, governance, participation, access to justice, media and ethics, crime, terrorism and security, access to and effects on social protection, educational systems.

Note that the above impact categories are not all relevant across all stakeholder groups.

6 Policy options

6.1 Scenario 1 - Baseline scenario

This scenario describes the situation without any change to the system for classifying wastes as hazardous. Since an adaptation of the provisions of the LoW to the new chemicals legislation is necessary anyhow, this scenario serves as a basis against which the other scenarios are compared only. It is not meant as an option for a future perspective.

Wastes are classified as hazardous, when they fulfil one or more of the H-criteria of the revised Waste Framework Directive (Directive on Waste 2008/98/EC). Generic concentration limits in addition to those defined in the DSD/DPD are defined in the LoW specifying which concentration of a substance with a certain dangerous property in a waste would lead to the classification of the waste as hazardous. No EU-level guidance on how to interpret the criteria and which procedure to apply for details of the waste classification exist.

Details of the scenario

On November 22nd 2008 the revised Directive 2008/98/EC on Waste (revised WFD) has been published in the official journal. A most relevant provisions of the revised WFD regarding the LoW and the characterisation of waste as hazardous or non-hazardous is the integration of the Hazardous Waste Directive (HWD) into the revised WFD and the new Annex III.

- The link between waste legislation and chemicals legislation is updated. The link includes now a reference to Directive 1999/45/EC instead of the reference to Directive 88/379/EEC as in footnote 2 of the LoW. The table below shows the differences of the texts. In addition the hazardous property “Ecotoxic” is now linked with Directive 67/548/EEC.

Table 2: Comparison old to new waste legislation

Old legislation (blue = amended text)	Revised WFD (red = new text)
HWD Annex III Notes 1. Attribution of the hazard properties 'toxic' (and 'very toxic'), 'harmful', 'corrosive' and 'irritant' is made on the basis of the criteria laid down by Annex VI, part I A and part II B, of Council Directive 67/548/EEC of 27 June 1967 of the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances (1), in the version as amended by Council Directive 79/831/EEC. 2. With regard to attribution of the properties 'carcinogenic', 'teratogenic' and 'mutagenic', and reflecting the most recent findings, additional criteria are contained in the Guide to the classification and labelling of dangerous substances and preparations of Annex VI (part II D) to Directive 67/548/EEC in the version as amended by Commission Directive 83/467/EEC	1. Attribution of the hazardous properties "toxic" (and "very toxic"), "harmful", "corrosive", "irritant", "carcinogenic", "toxic to reproduction", "mutagenic" and "eco-toxic" is made on the basis of the criteria laid down by Annex VI, of Council Directive 67/548/EEC of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances
LoW Footnote 2 The concentration limits refer to those laid down in Directive 88/379/EEC on the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations and its subsequent amendments.	2. Where relevant the limit values listed in Annex II and III of Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations shall apply.

As a consequence of the amendment from Directive 88/379/EEC to Directive 1999/45/EC the additivity principle was introduced in waste legislation. It is relevant for the H-criteria H4 Irritant, H5 Harmful, H6 Toxic, H8 Corrosive and H14 Ecotoxic (see also Table 21 regarding the application of the additivity principle).

- The revised WFD introduces the new hazard criterion "Sensitizing" and changes the sequence of hazardous properties in the Annex III. The table below summarises the amendments in the list of properties which render a waste hazardous (new/amended text in red)

Table 3: Comparison old vs. new list of H-criteria

H	Old List of H-criteria	New list of H-criteria
H9	'Infectious': substances containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms.	"Infectious": substances and preparations containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms
H10	'Teratogenic': substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce non-hereditary congenital malformations or increase their incidence.	"Toxic for reproduction": substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce non-hereditary congenital malformations or increase their incidence
H11	'Mutagenic': substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce hereditary genetic defects or increase their incidence.	"Mutagenic": substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce hereditary genetic defects or increase their incidence
H12	Substances and preparations which release toxic or very toxic gases in contact with water, air or an acid.	Waste which releases toxic or very toxic gases in contact with water, air or an acid
H13	Substances and preparations capable by any means, after disposal, of yielding another substance, e.g. a leachate, which possesses any of the characteristics listed above.	H 15 Waste capable by any means, after disposal, of yielding another substance, e.g. a leachate, which possesses any of the characteristics listed above.
H13 new		H 13 "Sensitizing": substances and preparations which, if they are inhaled or if they penetrate the skin, are capable of eliciting

H	Old List of H-criteria	New list of H-criteria
		a reaction of hypersensitisation such that on further exposure to the substance or preparation, characteristic adverse effects are produced
H14	'Ecotoxic': substances and preparations which present or may present immediate or delayed risks for one or more sectors of the environment.	"Ecotoxic": waste which presents or may present immediate or delayed risks for one or more sectors of the environment
H13		Waste capable by any means, after disposal, of yielding another substance, e.g. a leachate, which possesses any of the characteristics listed above

The revised WFD does not change the text of the LoW.

The LoW includes in Article 2 an outdated R-phrase where it reads: "one mutagenic substance of category 3 classified as R40 at a concentration ≥ 1%". The R-phrase R40 has been changed in 2001 and reads now "R40 Limited evidence of a carcinogenic effect"[14]. The appropriate new R-phrase for the bullet point in Art. 2 of the LoW is since then R68.

6.2 Scenario 2 – Adapted LoW

Scenario 2 comprises a number of individual measures:

1. General basis of the link between CLP and LoW
2. Detailing of selected H-criteria
3. Generic concentration limits
4. Specific concentration limits
5. Waste specific concentration limits
6. Generic waste characterisation strategy

[14] Commission Directive 2001/59/EC of 6 August 2001 adapting to technical progress for the 28th time Council Directive 67/548/EEC on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances OJ L 225, 21.8.2001, p. 1–333; Article 1: "Directive 67/548/EEC is hereby amended as follows:
1. Annex I is amended as follows: …
(e) The entries shown in Annex 1E to this Directive are amended by replacing classification references to "Muta. Cat. 3; R40" by "Muta. Cat. 3; R68" and by replacing labelling references to R40 by R68.
(f) The entries shown in Annex 1F to this Directive are amended by replacing classification references to "Xn; R40" by "Xn; R68" and by replacing labelling references to R40 by R68.
(i) The entries shown in Annex 1I to this Directive are amended by replacing classification references to "Muta. Cat. 3; R40" by "Muta. Cat. 3; R68".
(i) The entries shown in Annex 1I to this Directive are amended by replacing classification references to "Muta. Cat. 3; R40" by "Muta. Cat. 3; R68".

6.2.1 Measure 1: Link between LoW and chemicals legislation

In this scenario the hazard criteria (H-criteria) of the revised WFD 2008/98/EC are the basis for the classification of waste as hazardous waste as it is presently the case. A link to the respective hazard class and hazard category of the CLP Regulation is established in the LoW. This list comprises the hazard classes and hazard categories of CLP that most closely correspond to the currently applied R-phrases based on Annex VII Table 1.1 and Table 1.2 of the CLP Regulation[15] Details of the list are provided in vol.2 chapter 6.2.3 of this report. The link between the LoW and CLP Regulation is designed in a way that the H-classes and H-categories which are to be considered for the classification of a waste are fixed[16] as it has been before for the R-Phrases of the DSD.

Note 1 of Annex III of the revised WFD is amended in this scenario in order to link the hazardous properties with the CLP Regulation: "Attribution of the hazardous properties H1 – H8, H10, H11, H13 and H14 is made on the basis of the criteria laid down by Article 3 of the CLP Regulation"[17].

The term "preparation" is replaced by the term "mixture" in the revised WFD and the LoW and the term "dangerous" by "hazardous".

With this approach the basic element of the characterisation of waste (H-criteria) is maintained. This ensures that the administrative efforts resulting from the updated link between waste legislation and chemicals legislation is minimised.

The adapted link to CLP Regulation largely harmonises the application of the H-criteria with chemicals legislation. The maintenance of the system of H-criteria establishes a high degree of continuity for waste management.

Waste specific H-criteria like H9, H12 and H15 are maintained and further defined within waste legislation (see section 6.2.2 of this report).

At the same time further harmonisation on the worldwide level is achieved by linking the characterisation of waste with the European implementation of the Global Harmonised System GHS.

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[15] Council Position of June 2008

[16] In contrast to a link, where changes in the provisions of the CLP like new hazard categories are directly effective in waste legislation.

[17] Article 3 Hazardous substances and mixtures and specification of hazard classes: A substance or a mixture fulfilling the criteria relating to physical hazards, health hazards or environmental hazards, laid down in parts 2 to 5 of Annex I is hazardous and shall be classified in relation to the respective hazard classes provided for in that Annex. Where, in Annex I hazard classes are differentiated on the basis of the route of exposure or the nature of the effects, the substance or mixture shall be classified in accordance with such differentiation.

6.2.2 Measure 2: Detailing of selected H-Criteria

The following section describes the details on the amendments for the (old) H-criteria H9, H12, H13 and H14.

6.2.2.1 Criterion H9 – Infectious

The objective of this subtask is to develop potential definitions of the criterion H9 aiming, inter alia, at ensuring consistency of the approaches in the Member States.

In the Hazardous Waste Directive[18] (HWD) the criterion is worded as:

"H9 'Infectious': substances containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms."

6.2.2.1.1 Outcome from questionnaire

This section summarises the results of the questionnaire survey with regard to the application of H9. Detailed information by country is provided in Annex 8.7

Definitions for H9 'infectious'

In most Member States the classification of infectious waste is based on the definition in the HWD Annex III.

Some countries like Italy and Estonia draw further information on the interpretation of H9 from the wording of the LoW codes for infectious wastes:

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

Several countries specify the definition of H9 and the respective waste codes:

- in specific national regulations or guidance notes on infectious waste;
- through reference to national health care regulations relating to infectious diseases;
- through reference to international or European or national regulations or standards.

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18 Directive 91/689/EEC

Specific national regulations on infectious waste in general or waste from the health care sector in particular are adopted in Hungary, Italy, Romania, France and Spain (In Spain there exist regulations in some regions). In the Netherlands, the relevant LoW codes are specified in the National Waste Plan, section Hospital Care Waste. Specific guidelines on the management of infectious waste are mentioned by Germany, Finland and Denmark.

As regards international or European regulations reference is made to:

- ADR (European Agreement concerning the International Carriage of Dangerous Goods by Road) (e.g. mentioned by Finland, UK, the Netherlands)
- Technical guidelines on the environmentally sound management of biomedical and healthcare wastes, published by the Secretary of the Basel convention in 2003 (e.g. mentioned by Finland)
- Regulation (EC) No 1774/2002 of the European Parliament and of the Council of 3 October 2002 laying down health rules concerning animal by-products not intended for human consumption (e.g. mentioned by the Netherlands)
- Directive 2000/54/EC of the European Parliament and of the Council of 18 September 2000 on the protection of workers from risks related to exposure to biological agents at work (e.g. mentioned by Austria)

Estonia and Sweden point out that matters concerning H9 do not fall under the responsibility of the Ministry of Environment (EE) and the EPA (SE) respectively but under the responsibility of other institutions (e.g. the Ministry of Social Affairs in Estonia).

Methods for determination of H9 and related experience

In nearly all Member States the classification of infectious waste is based on the knowledge about the origin of the waste and on the clinical assessment of the contained micro organisms or toxins. This approach relies very much on the knowledge of the health care professionals that handle the potentially infectious materials, and on their responsible conduct. The application of H9 thus follows mainly a risk-based approach.

The responding Member States agree that microbiological testing is inappropriate and of little use as a key part of the assessment, at least in the health care sector. UK for instance emphasises that in the health care sector waste has to be handled before the laboratory results would be available. Furthermore, the vast range of hundreds of potential pathogens that would need to be screened for make the application of testing impractical. This view is confirmed by most other countries. The use of laboratory methods is mainly limited to the retroactive verification of a classification, or for instance in liquid waste emerging from large waste treatment autoclaves as part of the process monitoring.

Slovenia is the only country where the application of microbiological test is said to be the central part of the classification approach but does not specify how this approach works in practice.

Hungary has established a provision to perform testing in order to prove the non-hazardousness of waste that would in general be classified as infectious.

The approach to base the classification on the knowledge about the origin of the waste and on clinical assessment is mainly seen as satisfying. The Netherlands point out that the method is transparent, easy to apply and the analytical burden for administration and health care sector is small. On the other hand, it is emphasised that '*a lot of effort was needed to get an agreement with all stakeholders on an acceptable explanation of the definition'.'*

Italy reports that the definition of national classification rules has clearly improved and facilitated the classification and management of infectious wastes in health care institutions but points to the problem that the acceptance and application of the established rules is not satisfying in non-health care institutions (beauty salons, etc.).

Sweden indicates that there is an ambiguity about the scope of H9. It is unclear whether the scope includes waste from building materials containing mold toxins, called mycotoxins that may be present in the waste although the producing organisms have died.

Germany stresses the fact that the classification is very much in the responsibility of the medical staff.

Estonia points out that the classification of infectious waste is done differently from hospital to hospital due to a lack of a clear definition.

The French association FNADE indicates that problems could appear where chemical wastes are contaminated by "prions" or legionellosis. The problem, however, is not further specified.

Waste types that might be infectious

Infectious waste arises mainly in human health care and veterinary activities. Potentially infectious waste is thus found predominantly in the LoW chapter 18 which is dedicated to '*Wastes from human or animal health care and/ or related research (except kitchen and restaurant wastes not arising from immediate health care)'*. Most wastes from these activities bear the risk of being infectious and have to be assessed for infectiousness with the methods described above. Wastes from health care classified as infectious are assigned either to LoW-code 18 01 03* (waste from human health care) or to code 18 02 02* (waste from animal health care).

The property of H9, however, is not only relevant for the health care sector but for several waste categories from other sources. In response to the questionnaire the following waste types were named as potentially infectious:

- Wastes of animal origin (animal tissue waste, animal faces, manure etc.) from arising in agriculture, hunting, fishing, etc) (DE-SA, EE, ES);
- Animal wastes arising in food production (DE-SA, EE, ES);
- Wastes from waste and waste water treatment like sewage sludge and leachate from landfills (ES, EE);
- Municipal clinical waste that does not arise from healthcare (UK) (Examples provided by UK: substance abuse litter; sharps from body art and body piercing)
- Construction and demolition waste containing viable spores or toxins; (UK, SE)
- Canal dredging contaminated with cyanobacterial algal toxins (UK);

Some of the waste types mentioned, like infectious C&D waste and canal dredging are rather specific. UK reports that there have been cases where horsehair plaster from historical buildings contained viable anthrax spores. UK points out that the arising of canal dredging with algal toxins does exist but seems rather unlikely.

The relevance of infectious waste from agriculture, food processing and waste and waste water treatment is certainly higher, both with regard to quantities and with regard to frequency.

6.2.2.1.2 Analysis of selected guidance documents

For a compilation of useful definitions and approaches the following two guidance documents were chosen to represent the approaches in the member states:

- The German “Guidelines on the Application of the Waste Catalogue Ordinance of 10 December 2001” [DE 2005]
- The “Hazardous waste. Interpretation of the definition and classification of hazardous waste (Technical Guidance WM 2.1)” [UK 2005B].

Both guidelines give a detailed assessment including examples and references to other documents.

Firstly the terminology regarding the criterion H9 ‚infectious’ is of interest:

The guideline of the United Kingdom [UK 2005B] uses the definition of the property H9 ‚infectious’ of the Hazardous Waste Directive 91/689/EC (HWD):

- *“substances containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms"*

The terms used for this definition are defined as follows:

- *"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 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" - This includes animals, but not plants. The European Waste Catalogue provides sub-chapters for human and animal healthcare only.*

The German "Guidelines on the Application of the Waste Catalogue Ordinance"[DE 2005] starts with a reference to the waste codes of 18 01 and/or 18 02 of the ELW. The guidance document specifies the definition of infectious waste by making reference to national regulations on infectious diseases in human and animals:

1. Infektionsschutzgesetz §7 (Act on the prevention and control of infectious diseases in man) (see Annex 8.1)
2. Verordnung über anzeigepflichtige Tierseuchen (Ordinance on notifiable animal epidemics) (see Annex 8.2)
3. Verordnung über meldepflichtige Tierkrankheiten (Ordinance on notifiable animal diseases) (see Annex 8.3)

These additional and specific national regulations contain lists explicitly naming micro-organisms or infectious substances. The German LoW- guideline [DE 2005] defines a waste as infectious according to H9 if it contains one of the micro-organisms or infectious substances mentioned by these additional regulations.

For further guidance the German document refers to the 'LAGA-Guideline on the proper management of wastes from healthcare institutions' of January 2002 [DE 2002] which is guidance for the waste separation at health care institutions.

The guidance document of the UK [UK 2005B] contains decision trees to assist the waste holder in categorization of the waste with regard to H9/infectious.

The categorization is divided into 3 different areas:

- Human or animal healthcare (identical with chapter 18 of the LoW)
- Potentially infectious waste from other sources (LoW-chapters 1-17 19 and 20)
- Microbial toxins

The decision trees are displayed in Annex 8.4 and in Annex 8.5.

Both guidance documents point out that the professional assessment of individual cases is important.

Four different application fields are reviewed more profoundly in the following:

a) Infectious waste from human and animal healthcare
b) Infectious waste from other sources
c) Microbial toxins
d) Sharps and medical equipment

Infectious waste from human and animal healthcare

In Germany, the 'Guideline on the proper management of wastes from healthcare institutions' [DE 2002] is the resource for the correct classification of waste streams at source and gives advices for handling and disposal of wastes at source. The guideline emphasises the following: *"As infection-epidemiological and hygienic knowledge is indispensable for the judgement on infection risks, all necessary measures in medical services are determined case by case taking into account the local conditions and requirements in consent with the doctor commissioned for hygiene or any other accredited personnel, works doctor and officials in charge of waste management and worker's safety".*

Testing methods were not described in any of the guidelines. Usually testing methods are only applied retrospective because for the handling of infectious waste it is necessary to take decisions before the laboratory results are available [UK 2007A]. The UK guideline also states that the main focus here is the assessment done by qualified personnel.

Infectious waste from other sources (LoW chapters 1 to 17, 19 and 20

For the assessment of waste from other sources an established risk-based assessment as for health care waste does not exist. Furthermore, there are no limit values for criterion H9. For these cases the UK guidance document [UK 2005B] introduces the term "*concentration on a level naturally encountered"* as a criterion for the distinction between infectious and non-infectious waste. In case of low probability for the presence of infectious substances, or where concentration is at a level naturally encountered, the waste should not be classified as hazardous by H9.

It is pointed out in the document that:

"The term 'a level naturally encountered' is difficult to define, but can be taken to accept the presence of pathogens in wastes arising from a generally healthy population or environment. For example this may include the majority of foodstuffs, soil, construction and demolition waste, wastes treated to eliminate pathogens and domestic refuse." [UK 2005B, Appendix C9.4.2]

Toxins

The UK guidance document explicitly includes microbial toxins into the definition of the H9 property. Examples of toxin-producing bacteria given in the UK document include:

- Clostridium botulinum and C. perfringens,
- Toxigenic Vibrio sp . and verocytotoxin or enterotoxin producing E.coli
- Cyanobacteria - blue green algae ,
- Dinophyceae - (Paralytic/Diarrhetic Shellfish Poisoning, Fish Kills)

The document points out that risk assessment, analysis or knowledge should be used to determine if the waste is likely to contain a microbial toxin above a level naturally encountered. Toxins from micro-organisms are assessed in the same manner as chemical toxins. With regard to the limit values the document refers to the assessment of the properties H5 'Harmful' and H6 'Toxic'

The Latvian draft guideline [LV 2005A] uses the same classification scheme as described in the UK document, but refers for toxins to a limit value of 0.1 %.

The UK document provides the following examples for possibly relevant waste types:

- Canal dredging, or surface skimmings, from a site where a cyanobacterial bloom has occurred.
- Sludges from an industrial effluent plant where industrial or commercial activity has increased the numbers or ranges of pathogens normally present.

Sharps and medical equipment

As answers from the questionnaire suggested that in some countries (e.g. Netherlands, Italy, Hungary) used sharps and needles might be generally classified as hazardous, specific attention to this point was paid in the analysis of the guidelines. The analysis showed that in none of the guidance documents of member states sharps were generally classified as hazardous. Sharps are subject to the same classification methods applied for any other hospital waste, but secondary regulation and guidance documents such as the LAGA Guideline [DE 2002[give more detailed information on the handling and disposal of sharps *(cp. Annex 8.6).*

The UK guideline [UK 2005B] does not generally categorize sharps as infectious, but gives additional classification advice where a separate assessment is necessary and where not. The document concludes:

"Clinical waste classified in chapter 20 of the EWC2002 (that does not arise from Human or Animal Healthcare and/or related research.) is therefore not subject to assessment"?

- *Sharps litter from substance abuse (20 01 99),*
- *Sharps waste from cosmetic body piercing and application of tattoos (20 01 99).*

This waste is still subject to a requirement to be rendered safe. (This does not include community healthcare waste, for example diabetic sharps, which should be classified under chapter 18 and are subject to assessment)".

6.2.2.1.3 Basel Convention

In the Basel Convention criterion H6.2 reads:

"Substances or wastes containing viable micro-organisms or their toxins which are known or suspected to cause disease in animals or humans".

It is explained as follows: "Any waste known or clinically assessed to be at risk of being contaminated with any of the infectious substances in Category A of Division 6.2 of chapter 2.6 of the United Nations Recommendations on the Transport of Dangerous Goods, Model Regulations, 13th Edition, or any waste known to contain cultures of Category B of the substances listed in Division 6.2" [Basel 2004 p.2].

The technical guidance document concludes its analysis of the criterion H6.2 that "infectiousness is not an intrinsic hazard" [Basel 2004 p.4] and explains: "Infectiousness is an inherently unstable and variable property dependent on biological qualities. Different test results can be obtained at different times under the same test conditions" [Basel 2004 p.6].

6.2.2.1.4 Other legal provisions

Directive 98/8/EC (Biocides Directives) requires placers on the market of biocide active substances to have these included in one of its Annexes. Inclusion of an active substance is preceded by the submission of a technical dossier containing information on the active substance by the placer on the market. In case the active substance is a biological material (fungi, micro-organisms or viruses), information on its pathogenicity is required as part of the Dossier (Annex IVa of Directive 98/8/EC).

Pesticides (Directive 91/141/EC) may also be of biological origin and hence, a dossier for such active substances to be used in plant protection products is to contain information on the respective organism as well. It is to be specified how persistent it is in the environment under the condition of application of the plant protection product, its sensitivity towards the main parameters (temperature, humidity, pH etc.).

In the biocides and the pesticides legislation, the terms "infectious" or "pathogenic" are not defined. Furthermore, no specific test methods or criteria are given to decide whether or not an organism is infectious or not. Also, no guidance documents exist clarifying which information is to be generated. This is mainly due to the fact that the organism as such is the product and knowledge on its infectivity becomes available as part of its development process. Furthermore, a qualitative description is needed rather than an 'objective' measure of whether or not an infection is likely and at which concentration. The respective legislation does therefore not contain any helpful information to use in the work on H9.

6.2.2.1.5 Summary and conclusions

It was stated by stakeholders that the definition of H9 'infectious' in the HWD and the wording of the respective waste codes are not specific enough for practical application. Several countries have specified the scope of H9 by reference to other national/international regulation or additional guidance documents for classification which provide list of diseases or organisms/ substances causing diseases. The classification of infectious waste from health care is generally based on the assessment by qualified personnel. Laboratory testing is not seen as appropriate key element for classification, but suitable only for specific purposes like subsequent verification of the clinical assessment.

It seems that most of the national regulations and guidance documents refer to the human health care sector and related research and, to a lesser degree, to waste from veterinary activities. The classification of possibly infectious waste from other sources and the connected classification problems seems to attract less attention in the guidelines. Possibly infectious waste types are assumed to arise in agriculture, food processing, waste and waste water treatment, in the municipal sector and in special cases also in the construction sector. The UK guidance note tackles the problem of waste from other sources.

Ambiguity exists with regard to the scope of the property 'infectious'. It seems unclear whether H9 covers waste containing microbial toxins, even when the producing organisms have died.

Chemicals legislation does not provide an appropriate definition of the criterion H9. In plant protection and biocides legislation, no specific concepts for classifying active substances which may be pathogenic are described, but individual expert judgement and non-standardised information is required. The analysis of the criterion H6.2 ("infectious substances") of the Basel Convention concludes that this criterion is not an intrinsic hazard and a risk based approach is required.

Concluding from the analysis it is seen as possible to tackle the issues by keeping the current wording of criterion H9 in principle and add commonly agreed definitions of key terms in a legally binding way: "micro organism", "viable", "their toxins", "disease" and "living organism".

In a first step characterisation of waste can be done in a non-testing procedure from knowledge based judgement (see also chapter 6.2.6.3 on the generic characterisation strategy). The applied criteria are:

- origin: a common list of relevant economic sectors (e.g. health care, laboratories) and activities (e.g. waste from culture or enrichment of micro-organism) should be applied (see list below)
- type of waste: a common list on European level of wastes for which criterion H9 is to be seen as fulfilled in any case provides additionally for consistency in the application in the Member States (see list below),

Table 4: Waste origins for which the hazard property H9 might be relevant

Origins of wastes for which the hazard property H9 might be relevant
wastes from research, natal care, diagnosis, treatment or prevention of disease in humans (including all origins like hospital, dentist, Nursing home, etc.),
wastes from research, diagnosis, treatment or prevention of disease involving animals,
Laboratory waste (including microbiological waste from colleges, environmental and food analysis),
Wastes of animal origin (animal tissue waste, animal faces, manure; waste arising in agriculture, hunting, fishing, etc; including wastes are contaminated by "prions" or legionellosis);
Animal wastes arising in food production;
Wastes from waste and waste water treatment like sewage sludge and leachate from landfills;
Municipal clinical waste like waste from substance abuse litter; sharps from body art and body piercing,
Construction and demolition waste containing viable spores or toxins;
Canal dredging or surface skimmings contaminated with cyanobacterial algal toxins;

Table 5: Waste types for which the hazard property H9 might be relevant

LoW code	LoW designation
02	Wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing
02 01	Wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing
02 01 02	Animal-tissue waste
02 01 06	Animal faces, urine and manure, effluent, collected separately and treated off-site
02 02	Wastes from the preparation and processing of meat, fish and other foods of animal origin
02 02 02	Animal-tissue waste
02 02 03	Materials unsuitable for consumption or processing
17	Construction and demolition wastes (including excavated soil from contaminated sites)
17 05	Soil (including excavated soil from contaminated sites), stones and dredging spoil
17 05 05*	Dredging spoil containing dangerous substances (UK: canal dredgings contaminated with cyanobacterial algal toxins´; unlikely but theoretically possible.)
17 09	Other construction and demolition wastes
17 09 03*	other construction and demolition wastes containing dangerous materials (UK: horsehair plaster from historical buildings containing viable anthrax spores. there have been a number of instances where this has occurred)
17 xx	Waste from building materials containing mold toxins, called mycotoxins. The toxins may be present in the waste although the producing organisms have died
18	Wastes from human or animal health care and/ or related research
18 01	Waste from natal care, diagnosis, treatment or prevention of disease in humans
18 01 01	Sharps (except 18 01 03)
18 01 03*	Wastes whose collection and disposal is subject to special requirements in order to prevent infection
18 01 04	Wastes whose collection and disposal is not subject t o special requirements in order to prevent infection (for example dressings, plaster casts, linen, disposable clothing, diapers)
18 02	Waste from research, diagnosis, treatment or prevention of disease involving animals
18 02 01	Sharps (except 18 02 02)
18 02 02*	Wastes whose collection and disposal is subject to special requirements in order to prevent infection
18 02 03	Wastes whose collection and disposal is not subject to special requirements in order to prevent infection
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 07	landfill leachate
20	Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions
20 01	Separately collected fractions
20 01 99	Other fractions not otherwise specified

It is proposed to include the lists in a European Guidance Document on the application of the LoW.

Testing is proposed as a second stage (in most cases in form of subsequent test when the disposal activity already took place), where necessary, in order to check the results from the knowledge based approach.

The decisive role of the personnel at the place of origin should be emphasised and appropriate guidance shall be made available in order to support their choice.

This approach results in minimised additional administrative efforts from the further detailing of criterion H9.

Table 6: Summary criterion H9

Topic	Existing Legislation	Proposal for a revised text / approach	Comments
Definition	Substances containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms.	Wastes containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms]	The definition must be accompanied by clear definition of terms in order to achieve harmonised implementation
Definitions for terms	Not available	• "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 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" - This includes Animals, but not plants.	
List of origins and waste types	Not available	To be included in a EU guidance document	

6.2.2.2 Criterion H12 – release of toxic or very toxic gas

This subtask aims at developing quantified values on how to apply the H12 criterion to waste. Quantification should include the allocation of concentrations limits if possible.

In Annex III to the revised WFD the criterion is worded as:

"H12: Waste which releases toxic or very toxic gases in contact with water, air or an acid."

6.2.2.2.1 Results from questionnaire

This section summarises the results of the questionnaire survey with regard to the application of H12. Detailed information by country is provided in vol. 4 Annex 9 to this report.

In the questionnaire it was asked whether the criterion H12 is actually applied for the classification of hazardous waste in the Member States. The answers show that H12 is applied at least in 9 of the 18 Member States which answered to the questionnaire. In 5 countries the responding institutions had no reliable information on the application, and Italy stated that H12 is not applied. The remaining countries did not answer this question.

Table 7: Answers to question 27 concerning the application of H12

Criterion is applied in:	AT, DK[2,] FI, FR[1], DE, HU, SI, ES, UK
No information available whether H12 is applied in:	EE, LT, RO, NL, SE
H12 is not applied in:	IT

1) FR: Information from Arcelor and FNADE

2) DK: Information from DAKOFA

Methods for determination and concentration limits applied

The application of H12 in Member Sates is based on the following approaches:

- Classification on the R phrases, sometimes in combination with quantitative determination of gas release;
- Analytical determination of purgeable/reactive sulphides and cyanides in combination with limit values;
- Calculation of potential release based on the composition of the waste.

The application of H12 is primarily based on the following risk phrases:

R29: Contact with water liberates toxic gas

R31: Contact with acids liberates toxic gas

R32: Contact with acids liberates very toxic gas

Wastes that contain substances/preparations labelled with one of these R-phrases have to be assessed for the potential release of toxic gases.

In Germany, Spain and UK these R-phrases are applied in combination with the limit value of 1 l of toxic/very toxic gas released per kg and hour. Spain points out that in order to apply this criterion the mass of gas determined is transformed to volume of gas at standard temperature and pressure.

Testing is mainly based on test method A12 according to Annex V of Directive 67/548/EEC, a method that is primarily intended to test for R15 (release of flammable gases). A12 is applied in Germany, Slovenia, Spain, UK and Finland:

- UK proposes method A12 to test for R29; for R31 and R32 modified versions are recommended in the UK guidance document [UK 2005B]. Finland refers to the UK guidance document.
- Spain combines test method A12 with other methods that include US EPA standards.
- Slovenia mentions in addition to method A12 the DIN standard 38414-8 for the determination of the amenability to anaerobic digestion of water, waste water and sludges.

In Denmark and Latvia the classification is also based on the R-phrases mentioned above but no testing is done.

Differences exist with regard to the gases that are considered. In Austria H12 applies only to waste with a yield of purgeable sulphides and cyanides above legally defined limits. The other countries consider the release of other hazardous gases. This includes in the UK for instance hydrogen fluorides, sulphur dioxide, chlorine, nitrogen dioxide and ammonia.

Limit values for sulphides and cyanides are reported by Austria, Slovenia and Spain. Austria and Slovenia use the following limits:

◦ Sulphide: 10,000 mg/kg (dry mass)

◦ Cyanide: 1,000 mg/kg (dry mass)

Spain has no legally defined limit values. According to information from a Spanish laboratory, US EPA criterion for reactive sulphide (500 mg/kg) and cyanide (250 mg/kg) are often used in practice.

Slovenia points out that, in addition to the limit values for sulphide and cyanide the assessment is based on maximum exposure levels (MEL) and on a risk analysis for each individual case.

In the Spanish questionnaire it is criticised that none of the methods applied is risk-based and thereby quite useless. It is concluded that if no risk based thresholds and associated 'reactivity' methodology is agreed at the EU level it would be best to eliminate criterion H12.

Relevant waste types

Information on waste types that might be hazardous on account of criterion H12 were provided by Austria, Germany, Latvia, Slovenia, Spain, Sweden and by the associations FNADE (FR) and Dakofa (DK). The reported waste types are spread among several LoW-chapters. Relevant waste types are mainly found in the chemical industry (chapter 06), in the metal industry (chapter 10) and surface treatment (chapter 11). The most frequently types of waste are the following:

- Wastes from inorganic chemical processing (chapter 06), in particular
  - solid salts and solutions containing cyanides (06 03 11*);
  - wastes containing dangerous sulphides from MFSU of sulphur chemicals, sulphur chemical processes and desulphurisation processes (06 06 02*);
- Wastes from thermal metallurgy, e.g.:
  - skimmings, salt slags and flue-gas dust from aluminium metallurgy (10 03 08*, 10 03 15*, 10 03 19*)
  - dross and skimmings from zinc and other non-ferrous metallurgy (10 05 10*, 10 08 10*)
- wastes containing cyanide from tempering processes (11 03 01*);
- acid-generating tailings from processing of sulphide ore (01 03 04*);
- lithium batteries.

The detailed list of waste reported as relevant by the questionnaire respondents is provided in Annex 9.6.

6.2.2.2.2 Analysis of selected guidance documents

The guidance documents "Guidelines on the Application of the Waste Catalogue Ordinance of 10 December 2001" [DE 2005] and "Hazardous waste. Interpretation of the definition and classification of hazardous waste (Technical Guidance WM 2.1)" [UK 2005B] contemplate the application of the hazard criterion H12 most profoundly and are taken into consideration of the discussion of different approaches to assess this parameter.

Additionally, the UNEP Document "Guidance document on the application of hazard characteristic H10 of Annex III" [Basel 2005] is further discussed.

Terminology/Definition

The UNEP and the EU definition of the H12 criteria differ with respect to the contact with acid. Contact with acid is used by EU only and excluded by UNEP definition. All guidance documents of EU countries use the definition, which includes contact with acid.

The "Guidelines on the Application of the Waste Catalogue Ordinance" [DE 2005] determines the hazard H12 based on the R-phrases R29, R31 and R32. The German guideline renders a waste hazardous, if a minimum 1 l/kg h of toxic or very toxic gases are released and gives examples of constituents to which property H12 may apply:

- aluminium nitride, aluminium phosphide, phosphorus(V) sulphide (R29),
- sodium hypochlorite, chlorinated lime, alkali and alkaline earth sulphides and polysulphides, sodium dithionite (R31),
- salts of hydrocyanic acid, sodium azide (R32).

The guidance document UK 2005B states that one of the following risk phrases has to be identified for a substance or preparation in the waste if the waste is to have the potential to exhibit hazard H12:

R29 *Contact with water liberates toxic gas*

> *Substances and preparations which in contact with water or damp air evolve very toxic/toxic gases in potentially dangerous amounts. Examples of such substances include aluminium phosphide and phosphorous pentasulphide.*

R31 *Contact with acids liberates toxic gas*

> *Substances or preparations which react with acid to evolve toxic gases in dangerous amounts. Examples of such substances include sodium hypochlorite and barium polysulphide.*

R32 *Contact with acids liberates very toxic gas*

> *Substances or preparations which react with acid to evolve very toxic gases in dangerous amounts. Examples of such substances include salts of hydrogen cyanide, sodium azide.*

Any combined risk phrase including R29, R31 or R32 with other risk phrases indicates the potential to exhibit Hazard H12. A special case is the combined risk phrase:

R15/29 *Contact with water liberates toxic, extremely flammable gas*

This risk phrase indicates that Hazard H3A (fifth indent) also applies. The assessment methodology is similar, and the threshold for H3A (v) will be the same as that for H12.

In relation with these R-phrases the guidance document gives examples of and limit values for substances which may cause a waste to exhibit hazard H12 and explains the regarding chemical reaction in order to understand the reason for the application of this hazard criterion.

This selection of substances is explained as follows in the guidance document UK 2005B: *"From the listing of substances on the ASL [Approved Supply List, national chemical law] which exhibit this hazard property, the toxic or very toxic gases which could be released by chemical reaction with water, air or an acid appear to be limited at present to those set out in Table C12.1*." The respective table is set out in Annex 9.2.

As mentioned the UNEP [Basel 2005] document defines the hazard criterion for "Liberation of toxic gases in contact with air or water"; a definition that does not include acids. Consequently under this definition only R29 is mentioned from the R-phrases. But the guideline states that in practice most chemical reactions form an acid as a key precursor.

Appendix A of the UNEP guideline contains a list of *"Water-Reactive Materials Which Produce Large Amounts of Toxic Gas(es) When in Contact with Water*. ", which derives from the US Emergency Response Guidebook. This list comprises more substances than the equivalent European list on R29 and makes no use of two substances, which are only mentioned in EU legislation. Additionally the Appendix A includes a list from the Slovak Republic on general substance groups.

Test methods

Regarding test methods, the German guideline [DE 2005] refers to Annex V of the Directive 67/548/EEC.

The guidance document UK 2005B offers a calculation method for waste with a known composition (s. Annex 9.5). Limit values and chemical reactions are described in the document and test methods, which are based on A12 of the Directive 92/32/EEC, are indicated. Also gas release tests for SO_2 are included here (see Annex 9.4).

UNEP [Basel 2005] document, which also makes reference to the SO_2 gas release test of UK 2005B, suggest the following assessment strategy:

"(a) Initial assessment based on lists of hazardous and non-hazardous waste as included in Annexes VIII and IX;

(b) Assessment based on knowledge of the composition of the waste and its content of hazardous chemicals" including

analysis of the 'history of waste' before testing

(c) Tests (three methods are described to detect the probability of certain types of gas release)"

6.2.2.2.3 Definition in the Basel Convention

The Basel Convention comprises the hazard characteristic "H10 Liberation of toxic gases in contact with air or water - Substances or wastes which, by interaction with air or water, are liable to give off toxic gases in dangerous quantities."

In the definition of the Basel Convention, acids are not included as reactants; hence the scope of the H10 is narrower than for criterion H12 of the HWD.

If a waste is not contained in Annex VIII or IX of the Basel Convention, it should be assessed whether or not substances known to liberate toxic gases in contact with air or water are contained in the waste in concentrations above 0.5%. This value has been set based on experience. A list of substances derived from various sources, including the EU classification and labelling data base (R29) is contained in the Appendix of the guidance document for the application of the criterion [Basel 2005].

If the composition is unknown, tests should be conducted if there is suspicion that toxic gases could be released. 3 methods are indicated and described in an appendix of the guidance document and relate to the suspicion of release of different types (cyanides, sulphides etc.).

Further development needs which are acknowledged in the guidance document relate, among other, to the concentration limits for substances fulfilling the H10 criterion and potential additive/synergistic effects of several H10-substances below the concentration limits.

6.2.2.2.4 Concept in chemicals legislation

The R-phrase R29 "Contact with water liberates toxic gas", R31 "Contact with acids liberates toxic gas" and R32 "Contact with acids liberates very toxic gas" can be regarded as describing the danger addressed by H12 of the LoW. The definitions[19] in the DSD do not specify any concentration limits but only give a qualitative indication as to when to assign this R-phrase, including examples of what is a '(very) toxic gas'. These R-phrases only have to be assigned as addition to other classification. There is no differentiation for applying this R-phrase between substances and preparations and there are no test methods specified in Annex V of the DSD. The EU risk phrase R29, R31 and R32 have been implemented in the CLP regulation as additional hazard statement (EUH029, EUH31 and EUH032).

The Seveso Directive (96/82/EC) was analysed as it regulates installations handling substances that may cause risk of accidents. The R-phrase R29 is one triggering obligations under the said directive, but no concentration limits of further specifications are made that could be used for waste classification.

6.2.2.2.5 Summary and conclusions

The criterion H12 is actually applied in half of the responding countries. The effective number of countries that apply H12 is probably higher. However, not all responding institutions were able to provide reliable information on the subject.

The classification is mainly based on the R-phrases R29, R31 and R32. Test methods and limit values are applied in most of the 9 countries that apply H12. Testing is mainly done using test method A12 according to Annex V of Directive 67/548/EEC, sometimes in combination with other methods or in modified forms. In Germany, Spain and UK the R-phrases are applied in combination with the limit value for toxic gas release of 1 l/kg*h. Concerns have been raised because a similar value of 1 l/kg*h is set e.g. in Germany in the context of criterion H3A and the value of 1 l/kg*h has been named as inappropriate for the risk path human health and toxic/very toxic gases.

Austria and Slovenia have established limit values for sulphide and cyanide (sulphide: 10,000 mg/kg; cyanide: 1,000 mg/kg). In Spain, lower limits are applied on an unofficial basis.

The concept of substances /mixtures releasing toxic gases is only an addition to classification under existing chemicals legislation. It will be also part of the CLP regulation. The explanation of when to assign the R-phrases to chemicals does not provide helpful information for the development of a concept for classifying wastes.

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[19] "For substances and preparations which in contact with water or damp air, evolve very toxic/toxic gases in potentially dangerous amounts, e.g. aluminium phosphide, phosphorus pentasulphide."

Concluding from the available information it is proposed:

- A quantification of released gas volume based on expert judgement of1l/kg*h shall be set as part of the revised Article 2 of the revised LoW.
  A review date shall be fixed to check whether new scientific findings about the appropriateness of this value for the risk path human health are available that would lead to another value.
- A list of most relevant gases related to R-phrases (respectively H-classes and categories) shall be included in a European Guidance Document aiming at harmonising approaches in the Member States and reducing administrative efforts.
- A list of most relevant substances and concentration limits for substances in waste shall be included in a European Guidance Document in order to reduce analytic efforts in cases where the composition of the waste is known.

Table 8: Toxic gaseous substances released by H12 waste (non exhaustive list)

Substance	Hazard statements
Hydrogen sulphide	EUH029; EUH031, EUH032
Hydrofluoric acid / hydrogen fluoride	EUH029; EUH032
Carbon disulphide	EUH031,
Sulphur dioxide	EUH031,
Chlorine	EUH031,
Nitrogen dioxide	EUH032
Ammonia	EUH031,
Hydrogen cyanide	EUH032

Table 9: Threshold values related to criterion H12

Substance	Hazard statement	Concentration limit (%)
Phosphorus pentasulphide	EUH029	0.1
3,5-dichloro-2,4-difluoro- benzoyl fluoride (DCDFBF)	EUH029	1.0
Metam-sodium	EUH031	0.5
Barium sulphide	EUH031	0.8
Barium polysulphides	EUH031	0.8
Calcium sulphide	EUH031	0.3
Calcium polysulphides	EUH031	0.3
Potassium sulphide	EUH031	0.5
Ammonium polysulphides	EUH031	0.3
Sodium sulphide	EUH031	0.4
Sodium polysulphides	EUH031	0.4
Sodium dithionite	EUH031	0.9
Sodium hypochlorite, solution % Cl active[1]	EUH031	2.9
Calcium hypochlorite % Cl active[1]	EUH031	0.6
Dichloroisocyanuric acid	EUH031	0.9
Dichloroisocyanuric acid, sodium salt of	EUH031	1.0
Sodium dichloroisocyanurate, dihydrate	EUH031	1.1

Substance	Hazard statement	Concentration limit (%)
Trichloroisocyanuric acid	EUH031	0.7
Hydrogen cyanide, salts of (with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide)	EUH032	0.2
Sodium fluoride	EUH032	0.2
Sodium azide	EUH032	0.3
Aluminium phosphide	EUH032	0.3
Trizinc diphosphide	EUH032	0.6
Calcium cyanide	EUH032	0.2
Cadmium cyanide	EUH032	0.4
Calcium phosphide	EUH029	0.4
Aluminium phosphide	EUH029	0.3
Magnesium phosphide	EUH029	0.3
Trizinc diphosphide	EUH029	0.6

[1] Based on 29.3 g (NaOCl)/100ml (max solubility)

EUH029 = Contact with water liberates toxic gas.

EUH031 = Contact with acids liberates toxic gas.

EUH032 = Contact with acids liberates very toxic gas

Table 10: Summary - Criterion H12

Topic	Existing Legislation	Proposal for a revised text / approach	Comments
limit value	Not available	1 l of gas per kg of waste and hour	The value is set as a convention.
List of most relevant gases + hazard statements of CLP	Not available	Include list in guidance document	
Non exhaustive list of relevant substances	Not available	Include list in guidance document	

6.2.2.3 Criterion H15 – yielding another substance after disposal

The objectives of the task relating to criterion H15 are to identify approaches for the classification of wastes according to the criterion H15 and to develop respective threshold values.

The criterion has the new number H15 in the revised WFD (former number (H13) and is worded as follows:

"H15 Waste capable by any means, after disposal, of yielding another substance, e.g. a leachate, which possesses any of the characteristics listed above "

The wording of criterion H15 is open to interpretation in different ways:

- From the perspective of chemicals legislation, the term 'yielding another substance' would address a situation where a new substance, meaning one that has not been part of the waste, is formed. Thus either a chemical reaction or a degradation of substances contained in the waste would take place. In the definition itself however, leachate is given as an example which, from the chemical perspective, would normally not be regarded as 'another' substance but as a mixture of substances which have already been part of the waste. From the chemical perspective, a leachate would not fulfil the definition of a substance.
- From the perspective of waste legislation, the term 'after disposal' could be understood as after 'final disposal' on a landfill or by incineration or after a recycling process, from which a new product or material is obtained. The 'other substance' could also be understood as part of the recycled material.

In this chapter the "old" number H13 is used in retrospective contexts (e.g. regarding experiences with the application of the criterion in Member States).

6.2.2.3.1 Evaluation of 'yielding another substance' in the context of REACH and recycling activities

In the context of REACH a 'new substance' can result from any process, including recovery and disposal of waste. A new substance can be obtained either by

- Chemical reaction of two compounds (synthesis) or
- Purification of substances contained in mixtures or raw materials to an extent that the definition of 'sameness' of a substance no longer applies. No clear-cut criteria can be formulated as to when during a purification process the substance identity changes

Any substances which are formed unintentionally (e.g. during storage), or the formation of which would be neither wanted nor known to the owner of the material (e.g. unintended reactions during formulation or due to equilibrium reactions between weak acids or bases), are regarded as 'new substances' but are exempted from the obligation to be registered according to Annex V of REACH. Hence, the exact identity of substances arising from such processes does not need to be determined.

If a substance is obtained from a material, such as during processing of secondary raw materials or wastes, and it can be documented that the substance has been part of that material before that processing, it is not regarded as 'new' but as part of the life-cycle of the original (registered) substance. Thus, in the context of REACH a leachate would not be regarded as a new (or another) substance but be covered by the original material.

6.2.2.3.2 Evaluation of the definition in the Basel Convention guidelines of Annex III

In the Basel Convention, the definition of the H13 criterion is worded as follows: *"Capable, by any means, after disposal, of yielding another material, e.g., leachate, which possesses any of the characteristics listed above."*

In this definition, the term 'another substance' is not used but 'another material'. In the guidance document[20] on the application of H13 some clarification is made with respect to the understanding of the definition.

The question whether or not the term 'another material' could relate to a 'new substance' being formed after disposal is not relevant under the Basel Convention and no misunderstandings as in the EU Directive are possible. Here the wording of 'another material' in combination with the example of the leachate is not ambiguous.

In the guidance of the Basel Convention, there is a discussion as to whether or not leachate is the only type of material that could be formed and it appears that residues and air emissions are understood as 'another material' as well. Any type of recycled material placed on the market seems not to be regarded as 'another material'.

If the 'other material' yielded does not have dangerous properties, the criterion H13 is not fulfilled.

A difficulty is seen in the determination of H13 for the original waste; currently the actual eluates, emissions or residues from the various waste processing technologies are tested.

The term 'after disposal' implies that the properties or the assignment of H13 to a waste could depend on the method of disposal. It is discussed that this should not be the case, as it would introduce a risk based waste classification and would create inconsistencies with other H criteria. As indicated by the replies from several contracting parties of the Basel Convention, 'after disposal' is understood as including also recycling operations.

The contracting parties submitted information on which types of tests could be applied to test the hazardousness of waste, most of which referred to testing of leachate. This could be extracted either from solid wastes by elution or extracted with a solvent from liquid wastes.

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20 Interim guidelines on hazard characteristic H13 of Annex III to the Basel Convention

6.2.2.3.3 Landfill Decision

Members of TAC workshop on the implementation of the LoW concluded in March 2006 that the solid waste judgement for H13 should be based on elution tests. The concentration limits for hazardous waste disposed of on landfills for non hazardous waste, in particular those for heavy metals, should be taken into account.

Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC (2003/33/EC) ("Landfill Decision") specifies in its Annex (Criteria and procedures for the acceptance of waste at landfills) in section 2.3 criteria for hazardous waste acceptable at landfills for non-hazardous waste pursuant to Article 6(c)(iii):

"The following leaching limit values apply to granular hazardous waste acceptable at landfills for non-hazardous waste, calculated at L/S = 2 and 10 l/kg for total release and directly expressed in mg/l for C_0 (the first eluate of percolation test at L/S = 0,1 l/kg). Granular wastes include all wastes that are not monolithic. Member States shall determine which of the test methods and corresponding limit values should be used."

Table 11: Acceptance criteria according to Decision 2003/33/EC

Parameter	L/S = 2 l/kg	L/S = 10 l/kg	C0 (percolation test)
	mg/kg dry substance	mg/kg dry substance	mg/l
As	0,4	2	0,3
Ba	30	100	20
Cd	0,6	1	0,3
Cr total	4	10	2,5
Cu	25	50	30
Hg	0,05	0,2	0,03
Mo	5	10	3,5
Ni	5	10	3
Pb	5	10	3
Sb	0,2	0,7	0,15
Se	0,3	0,5	0,2
Zn	25	50	15
Chloride	10000	15000	8500
Fluoride	60	150	40
Sulphate	10000	20000	7000
DOC(*)	380	800	250
TDS(**)	40000	60000	—
(*) If the waste does not meet these values for DOC at its own pH, it may alternatively be tested at L/S = 10 l/kg and a pH of 7,5-8,0. The waste maybe considered as complying with the acceptance criteria for DOC, if the result of this determination does not exceed 800 mg/kg (A draft method based on prEN 14429 is available).			
(**) The values for TDS can be used alternatively to the values for sulphate and chloride.			

6.2.2.3.4 Outcome of questionnaire survey

This chapter summarises the results of the questionnaire survey with regard to the application of H13. Detailed information by country is provided in Annex 10.4.

Scope and application of H13

As shown in the table below criterion H13 is actually applied for the classification of hazardous waste at least in 9 of the 18 Member States from which information is available.

Table 12: Application of H13 in Member States

Criterion is applied	AT, DE, DK[2)], FI, HU, SI, UK, LV, ES
No information available whether H13 is applied	EE
H13 is not applied	NL, SE, IT, FR[1)]

1) FR: Information from Arcelor and FNADE

2) DK: Information from DAKOFA

The criterion H13 is not applied by NL, SE, IT and FR[21] for different reasons:

- The Netherlands point out that according to Dutch experience H13 is dispensable as there will always be another H property which is also applicable.
- Sweden does not apply H13 in general but the EPA indicates that leaching test data gathered for other purposes seem to be used in some instances as indicative data for waste classification.
- The French association FNADE says that the release of substances from waste is relevant only in combination with H14. H14, however, is explicitly excluded from the definition of H13. (A response from French authorities is not available).
- Italy does not apply the criterion H13 because of the lack of European-wide standardised test methods. Furthermore, Italy believes that the classification of wastes as hazardous can be fulfilled by the other criteria.

21 information from FNADE

Methods for determination and concentration limits applied

The available information shows that H13 is understood and applied rather differently in Member States. The existing approaches can be classified as follows:

- Classification solely on the basis of risk phrases, without testing and limit values (e.g. Denmark);
- Classification based on the leachability of contaminants determined by means of eluate testing and defined limit values (e.g. Germany);
- Classification considers not only leachate but also the total content of specific contaminants (e.g. Austria, Slovenia)
- A comprehensive assessment is done that uses relevant risk phrases and considers all possibilities of the production and release of other hazardous substances (e.g. UK)

Several countries limit the application of H13 to the leachability of waste. Concerning the test methods and the limit values for leachate those countries mostly refer to the acceptance criteria for the landfilling of waste as laid down in Decision 2003/33/EC[22]. This is done for instance by Hungary, Spain, Finland, Germany and Austria. Nevertheless, there exist several differences concerning the limit values applied:

- Some countries refer to the lower limit values of section 2.3.1 of Decision 2003/33/EC (limit values for the acceptance of hazardous waste at landfills for non-hazardous waste) whereas others refer to the higher values of section 2.4.1 (limit values for the acceptance of waste at hazardous waste landfills).
- The list of the parameters used varies between countries and within countries.
- Concentration limits for individual parameters are modified.

According to Decision 2003/33/EC the leaching tests shall be done pursuant to the following standards:

- prEN 14405 Leaching behaviour test - Up-flow percolation test (Up-flow percolation test for inorganic constituents)
- EN 12457/1-4 Leaching — Compliance test for leaching of granular waste materials and sludges

Germany indicates that recently a new method was set up and is currently evaluated by a ring test. The method is described as short-time column percolation elution method, suitable especially for mineral waste material.

[22] Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC (2003/33/EC) (OJ L 011, 16.01.2003, p.27

Some countries, including Austria, Germany and Slovenia, have established limit values for the total content of organic and inorganic contaminants, in addition to the limit values for leachate:

- Austria and Slovenia have established limit values for the total content of
  - Mercury, arsenic, cadmium, lead (only SI);
  - PAO, PCB, PCDD/PCDF, POX, Hydrocarbons, BTEX, Phenols)
- Germany has established a limit value for the total content of hydrocarbons in its national guidance document ([DE 2005] (see also chapter 6.2.2.3.5).

An overview of the available information on parameters and concentration limits applied in Member States for the assessment of H13 are shown in vol. 4 Annex 10.1 and 10.2

Risk phrases are used for the assessment of H13 by UK and Denmark (R1, R4, R5, R6, R16, R18, R19 or R44). Denmark relies solely on the classification by risk phrases; no testing is done. The UK follows a comprehensive approach, which is explained in more detail in chapter 6.2.2.3.5.

Relevant waste types

The range of wastes, which are considered as relevant to be assessed for H13 by Member States, is rather broad. It encompasses a variety of mineral wastes and sludges, in particular:

- Mineral construction wastes (sect. 17 01, 17 08, 17 09)
- Contaminated soils and dredging spoil (sect. 17 05))
- Mineral wastes from thermal processes (chap. 10);
- Wastes from the processing of minerals (chap. 01).
- Wastes from inorganic chemical processes (chap. 06)
- Sludges from chemical/physical waste treatment (sect. 19 02)
- Wastes from chemical surface treatment and non-ferrous metallurgy (sect. 11 01, 11 02).

The detailed list of wastes named by Member States is shown in vol. 4 Annex 10.5.

6.2.2.3.5 Analysis of Guidance Documents

Guidance on the application of H13 is provided by the following three documents which are assessed more closely:

- Guidelines on the Application of the Waste Catalogue Ordinance of 10 December 2001 [DE 2005]
- Hazardous waste. Interpretation of the definition and classification of hazardous waste (Technical Guidance WM 2.1) [UK 2005B]
- Vollzugshinweise zur Zuordnung von Abfällen zu den Abfallarten eines Spiegeleintrages (MLUV Brandenburg) [DE 2007C]

Following a rather broad interpretation, the UK guidance document determines that H13 applies to all wastes that could produce another substance, which would exhibit one or more of the hazards H1 to H12. Such a substance can be produced / released through:

- (microbial) degradation;
- leaching processes;
- reaction with other wastes or substances;
- combustion.

As a further element of the assessment, the following unassigned or associated R-phrases which might cause hazard H13 to arise should be taken into account:

R1 Explosive when dry

R4 Forms very sensitive explosive metal compounds

R5 Heating may cause explosion

R6 Explosive with or without contact with air

R16 Explosive when mixed with oxidising material

R18 In use may form flammable/explosive vapour-air mixture

R19 May form explosive peroxides

R44 Risk of explosion if heated under confinement

UK [UK 2005B] gives examples for wastes and treatment routes possibly bearing hazard H13 like:

- Storage of explosive substances;
- Uncontrolled combustion of organic waste containing chlorine that might release dioxins of hydrochloric acid;
- Accidental mixing of incompatible materials during chemical treatment;
- Building of leachates and digestates produced in landfills or anaerobic digestion.

For testing methods and limiting concentration UK [UK 2005B] refers to those for hazards H1 to H12.

The UK document structures the proposed assessment process in form of a decision tree which is shown in the Annex A10.4.

The national German guideline [DE 2005] does not provide a comprehensive specification of all circumstances that may lead to waste being classified as hazardous according to H13. The recommended approach is limited to the testing of risks from leachate. The proposed limit values are the same as in table 2.3.1 of Decision 22003/33/EC which defines the criteria for hazardous waste that is acceptable at non-hazardous waste landfills. In addition, the Guideline establishes a limit value for the total content of hydrocarbons.

The German Guideline does not refer to risk phrases because no specific R-phrases exists that would describe the risk from the formation of eluates.

The Guideline of the German State of Brandenburg [DE 2007C] also focuses on leachate only. The concentration levels defined in Annex V are similar but not identical with the ones given in the national guideline [DE 2005]. The lists of parameters as well as the limit values for a few parameters differ.

The list of parameters and limit values of the two German guidelines are included in the Annex A10.2 and A10.3.

6.2.2.3.6 Summary and conclusions

Hazard property H15 (former H13) is applied in at least half of the countries for which information is available. Some countries do not apply the criterion at all because they consider it as dispensable suggesting that the classification can be done on the basis of other H-criteria.

The available information shows that H13 is understood and applied rather differently in Member States. The main approach is the classification based on the leachability of contaminants determined by means of eluate testing and defined limit values. Further approaches are:

- Classification solely on the basis of risk phrases,
- The definition of limit values for the total content of selected contaminants,
- A comprehensive assessment taking into account all possibilities of the production and release of other hazardous substances.

Although the assessment of the leachate is mainly based on the concentration limits for eluates defined in the Landfill Decision[23] differences exist in the Member States with regard to the parameters and the limit values applied.

According to the information supplied in the course of this study criterion H15 is not operationalised in the Member States for other paths than the generation of leachates. Severe methodological problems have been stressed for example for the application of this criterion

23 2003/33/EC

to the incineration and co-incineration of waste. No information is available revealing cases where a waste has been characterised as hazardous because of an increases risk potential when incinerated.

As a second policy option criterion H15 can be focussed on generation of leachates. Setting the maximum concentration values for hazardous waste on non-hazardous landfills according to the Landfill Directive / Landfill Decision is proposed as a common and harmonised European basis.

This should not be misunderstood in a way that the waste is classified with the background of landfilling but they are applied as a convention taking up a European wide established leachate oriented classification set.

This approach enables to make the criterion H15 operational on a European basis with a minimum of impacts from adaptation efforts. No data basis is available that describes the amount of waste that is or would be classified at different limit values for leachate.

In case of deleting criterion H15 Member States that apply the criterion H15 successfully would be required to replace it by other approaches (see details in the section above).

Table 13: Summary H15

Topic	Existing Legislation	Proposal for a revised text
Definition	Substances and preparations capable by any means, after disposal, of yielding another substance, e.g. a leachate, which possesses any of the characteristics listed above.	Waste capable of yielding a substance at disposal which exhibits one or more of the hazards defined in Annex III of Directive 2008/98/EC
Concentration limits	Not available at European level	maximum concentration values for hazardous waste on non-hazardous landfills according to section 2.3 “Criteria for hazardous waste acceptable at landfills for non-hazardous waste pursuant to Article 6(c)(iii)” in the Annex to Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC (2003/33/EC)
Test methods	No available	Reference to Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC (2003/33/EC) and the applied leaching test methods as provided in section 3. SAMPLING AND TEST METHODS

6.2.2.4 Criterion H14 – ecotoxic

The objective of this task is to further develop the classification system with regard to H14 and outline approaches to make the criterion operational.

The criterion H14 is defined in Annex III of the revised WFD as follows:

H14 "Ecotoxic': waste which presents or may present immediate or delayed risks for one or more sectors of the environment.

The reference in the revised WFD to chemicals legislation for further definition of the H-criterion and information on respective testing methods includes a link to the property 'ecotoxic'[24] (the "old WFD 2006/12/EC did not include such link). Thus the reference in Annex III of the revised WFD saying: "The methods to be used are described in Annex V to Directive 67/548/EEC and in other relevant CEN-notes" also cover the property "ecotoxic".

6.2.2.4.1 Outcome from questionnaire survey

This chapter summarises the results of the questionnaire survey with regard to the application of H14. Detailed information by country is provided in vol. 4 Annex 11.5.

Application of H14 in Member States

According to the questionnaire return H14 is applied in at least 14 of the 18 Member States from which information was received. In 2 countries the responding institutions had no reliable information on the application of H14. Italy was the only country that stated explicitly that H14 is not applied to wastes. Italy does not apply H14 because of the lack of reference criteria for their application on the EU level.

Table 14: Application of H14 in Member States

Criterion is applied in:	EE, SE, FI, UK, SI, LV, BG, HU, DE, NL, DK[1], AT, FR[2], ES
It is not known whether the criterion is applied in:	LT, RO
Criterion is not applied in:	IT

1) DK: Information was provided by DAKOFA

2) FR: Information provided by FNADE

[24] Directive 2008/98/EC Annex III Note 1 says: Attribution of the hazardous properties 'toxic' (and 'very toxic'), 'harmful', 'corrosive', 'irritant', 'carcinogenic', 'toxic to reproduction', 'mutagenic' and 'eco-toxic' is made on the basis of the criteria laid down by Annex VI, to Council Directive 67/548/EEC of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances.

Definitions and scope of application

Most countries refer either to the definition of H14 as laid down in the HWD, or to the definition of 'ecotoxicity in the DPD.

Estonia refers to Directive 91/689/EEC but seems to have adapted the definition by including the wording 'dangerous for the environment' from the HWD[25].

Austria and Slovenia make reference to the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR). Class 9 of the ADR covers among others 'environmentally hazardous substances' (M6 and M7).

Table 15: Definitions used for the application for H14

Definition	Legal document	Used by
"Substances and preparations which present or may present immediate or delayed risks for one or more sectors of the environment"	Hazardous Waste Directive 91/689/EEC, Annex III	EE[1], FI, LV, LT, BG, HU, NL[2], ES
"Substances and preparations which are dangerous for the environment; substances and preparations which, were they to enter the environment, would or could present an immediate or delayed danger to the environment"	Dangerous Preparations Directive 1999/45/EC (Article 2)	SE, UK, DE
Environmentally hazardous substances: liquid or solid substances pollutant to the aquatic environment and solutions and mixtures of such substances	European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), Class 9	AT, SI

1) Estonia refers to Directive 91/689/EEC but has adapted the definition by including the wording 'dangerous for the environment' from Directive 1999/45/EC

2) NL refers to definition for H14 based on Directive 91/689/EEC and to R50/53 according to Directive 67/548/EEC

Differences between Member States exist with regard to the scope of properties considered. Some countries limit the application of H14 to the risks for the aquatic environment and the ozone layer. This includes Austria, Denmark, the Netherlands and the UK.

25 Wording of the Estonian Definition: Substances and preparations which are ecotoxic or dangerous for the environment and present or may present immediate or delayed risks for one or more sectors of the environment)

- Denmark and the UK refer to the R-phrases R50 – R53 and R59. UK is currently revising their national guidance document in order to include additional criteria.
- Austria considers the risks to aquatic environment and ozone layer without referring to the risk phrases. It is set out in the national Abfallverzeichnisverordnung (Ordinance on waste classification) that H14 applies to:
  - wastes with a total yield of FCKWs, HFKWs, FKWs and Halones over 2000 mg/kg DM, and
  - environmental hazardous substances due to class 9, M6[26] and M7[27] ADR
- The Netherlands limit the assessment to the aquatic environment (R50 – R53).

A broader application of H14 that includes risks to the terrestrial environment is applied in Bulgaria, Finland, France, Germany, Hungary and Sweden. These countries apply testing methods that include terrestrial biotests.

Table 16: Overview of relevant risk phrases for classification according to criterion H14

R-phrase	Designation
R50-53	very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
R50	very toxic to aquatic organisms
R51-53	toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
R52-53	harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment
R52	harmful to aquatic organisms
R53	may cause long-term adverse effects in the aquatic environment
R54+	toxic to flora
R55+	toxic to fauna
R56+	toxic to soil organisms
R57+	toxic to bees
R58+	may cause long-term adverse effects in the environ
R59	dangerous for the ozone layer

+ means that no official criteria exist in EU chemicals legislation

Methods for determination and concentration limits applied

As regards the limit values for R50 – R53 and R59, most countries follow the provisions of the chemical legislation. In cases where a substance is classified as ecotoxic in the chemicals legislation the limit values are also used for the evaluation of the ecotoxicity of the waste by most countries (FI, DK, EE, DE, LV, SE, UK). The limit values for R50 – R53 and R59 according to Directive 1999/45/EC as applied in Member States are shown in the table below.

[26] M6 Pollutant to the aquatic environment, liquid

[27] M7 Pollutant to the aquatic environment, solid

Table 17: Concentration limits for H14 according to 1999/45/EC, Annex III, Part B

total concentration of ≥ 0.25% of one or more substances classified as dangerous for the environment with R phrases R50 – R53.
total concentration of ≥ 2.5% of one or more substances classified as dangerous for the environment with R phrases R51 – R53.
total concentration of ≥ 25% of one or more substances classified as dangerous for the environment with R phrases R52 – R53.
total concentration of ≥ 0.1% of one or more substances classified as dangerous for the environment with R phrases R59.

Some countries have established or refer to other limit values:

- Austria applies a concentration limit of 2000 mg/kg DM for ozone depleting substances.
- As regards concentration limits for POPs Sweden makes reference to Annex 4 of the EC POPs Regulation.

Several countries apply biotests for the assessment of H14. This includes tests according to chemical legislation (methods according to EC Directive 67/548/EC, Annex V) but also additional test. Testing is done with eluate but also with solid waste. The following test methods were named by the responding countries.

Aquatic tests for waste eluate testing

- Fish test for acute toxicity — BG
- Daphnia tests for acute toxicity — FI, ES, DE, FR, UK
- Algal inhibition test — FI, HU, DE, FR, UK
- Vibrio fisheri luminescence test — FR, FI, ES
- Test for chronic toxicity with Ceriodaphnia dubia — FR
- Test for chronic toxicity with Brachionus calyciflorus — FR
- Test for genotoxicity with Salmonella typhimurium — DE

Terrestrial test for solid waste testing

- Earthworm test for acute toxicity — DE, FR
- Tests on soil flora — DE, FR, BG, HU,
- Tests with plants (without specification) — BG, FI

Sweden stresses that the use of bioassays for assessing acute and sub-chronic toxicity in aquatic and terrestrial environment is the “last resort”-option in the classification process.

The Netherlands follow a different approach for H14. They have defined a set of relevant parameters that include (heavy) metals, PAH, PCB, pesticides, cyanide, tetrachlorethene, trichlorethene. As there are no specific concentration levels defined for H14 in the LoW the classification and concentration levels of H3-H8, H10 and H11 are applied.

The approaches of UK and France (FNADE) as well as the work carried out concerning the standardisation of biotests for waste is described in more detail in chapter 6.2.2.3.5.

Experience with applied methods

Substantial input to the assessment of the applied methods was provided by UK, Germany[28], Sweden and Spain.

UK points out that the calculation methodology set forth in the national Chemical Regulations (CHIP) and the Dangerous Preparations Directive (DPD) supported by chemical analysis is clear and highly satisfactory. It aligns directly with chemical risk phrase classification systems and therefore with other hazardous properties

UK holds the view that animal testing of solid wastes is of little or no scientific value and generates results of debatable significance. Testing is described as of often poor quality, overlooks key criteria in relevant guidance, and results often suggest that the waste is non-hazardous where that is clearly not the case. UK assumes that in more than one case the analysis appears to have been undertaken principally because chemical analysis would show the waste to be hazardous, so ecotoxicity testing is being used (badly) in an attempt to obtain a different result.

UK emphasises that thresholds for ecotoxicity, or reference to thresholds in the Dangerous Preparations Directive, should be included in the LoW.

Sweden on the other hand doubts the suitability of the reference to the chemicals legislation. As an example the stringent ecotox-hazard classification of zinc-oxide is given. In addition, Sweden sees “many practical problems in applying the chemical legislation (dealing with separate metal compounds) in assessing hazards from metal containing solid waste, as its composition in its solid waste state in most case hardly can be analysed at a reasonable cost. Instead the stakeholder assessing his waste by leaching metals, has to cope with the problem of comparing metal concentrations in the leachate with the concentration limits for individual metal compounds to be found due to the hazard classification in the chemical legislation”.

Spain highlights that there are often problems due to the fact that wastes are complex matrices (coloured, oily, particulates, precipitates, etc). Considering that often the ecotoxicity test is the only real bioassay performed on waste, as it is by far the cheapest, it seems reasonable to use a test battery.

Relevant waste types

In the questionnaire the countries and stakeholders were asked to give examples of waste types that are classified as hazardous on account of criterion H14 but would not be considered as hazardous according to any other H-criterion. Input to this aspect was provided by Germany, UK, Sweden and Estonia.

According to German experience a manageable number of waste types exist, which needs to be classified hazardous exclusively according to H14. An example would be bottom ashes from the thermal treatment of municipal waste incineration (section 19 01). These are classified as hazardous according to H14 whereas none of the other hazard criteria are appropri-

28 The input of Germany is described in chapter 6.2.2.4.2

ate. This may also be the case for slags from combustion, metallurgy and other ashes currently listed in mirror entries (section 10 01).

Sweden also considers ashes from waste incineration as possibly hazardous according to H14. Relevant waste types are:

◦ 19 01 11* Bottom ash and slag containing dangerous substances

◦ 19 01 13* Fly ash containing dangerous substances

◦ 19 01 15* Boiler dust containing dangerous substances

In Estonia, oil-shale semi coke is classified hazardous on account of H14. Oil-shale coke is a specific Estonian waste type for which an additional waste code (05 06 97*) has been introduced into the Estonian waste list.

UK points out that under the revised Dangerous Preparations Directive the thresholds for extremely ecotoxic substances have been lowered. These thresholds are now lower than for any other hazardous property. In future, any waste containing an extremely ecotoxic substance may therefore potentially be classified as hazardous solely on the basis of ecotoxicity. According to UK, this is likely to include certain biocides/pesticides, certain medicines (anti-parasite), and perhaps a few metal compounds. These could conceivably occur in some sludges, treated wastes, contaminated land, as well as in off spec/waste products. The waste type 17 06 03* 'other insulation materials consisting of or containing dangerous substances' might be an example.

6.2.2.4.2 Analysis of Guidance Documents

For the guidance on the application of H14 the following documents were analysed, because they provided additional information on the matter.

- Hazardous waste. Interpretation of the definition and classification of hazardous waste (Technical Guidance WM 2.1) [UK 2005B]
- Methodological guide Waste classification. Practical application to storage centres [FNADE 2003].
- Executive summary: Results of an EU-wide ring test for the determination of ecotoxicity (H14) of three waste substrates. Evaluation of a validation study on CEN 14735 [DE 2007D]

The content of the German Guidance document is similar to the answers given in the questionnaire and is thus already reflected in the previous section.

The second and the third document are not exactly guidelines on the application of the LoW. The scope of FNADE 2003 is intended to be a practical tool for operators to dispose waste in suitable landfills and DE 2007D summarises results from a ring test. They were included to highlight specific approaches regarding the hazard criterion H14.

The approach of the UK guidance document [UK 2005B] is based on the classification criteria for substances that are 'dangerous to the environment' as laid down in the Dangerous Preparations Directive (1999/45/EC). The document uses Directive 1999/45/EC which specifies concentration limits for ecotoxic substances within preparations as the basis of the threshold concentrations for substances within a waste.

The UK approach considers only the hazards to the aquatic environment (R50 to R53) and to the ozone layer (R59). Risk phrases relating to the terrestrial environment (i.e. R54 to R58) are not considered as they are not currently included in the Directive 1999/45/EC. The UK supports the view of the OECD which states that “research has suggested that in the majority of cases possibly with the exception of some pesticides, an assessment of ecotoxic hazard based solely on aquatic toxicity data would result in the same classification as an assessment that included terrestrial effects" (OECD series on testing and assessment No. 33).

Combined or joint risk phrases are common for substances that are dangerous to the aquatic environment. Accordingly, the guidance document sets out the six possible classification combinations along with the resulting classification criteria. For more detail please refer to Annex 11.1.

For R59 (dangerous for the ozone layer) the UK document refers to Annex I of Council Regulation No 2037/2000 EC.

The UK document outlines that specific concentration limits are necessary for highly toxic substances due to their pollution potential and persistence in the environment. For PCBs and PCTs a limit of 50 mg/kg waste is proposed. Further substances shall be considered once international agreements on concentration limits are achieved.

The document proposes the following classification procedure:

- It should be determined whether the waste contains any substances classified with one or more or the relevant risk phrases (R50 to R53, R59). It should be considered that under the DPD, some of the risk phrases associated with aquatic toxicity are additive i.e. the concentrations of substances with the same and/or different risk phrases need to be added together to determine the correct classification for a preparation and subsequently the threshold concentration for determining whether the waste is hazardous by ecotoxicity. The combinations of additive effects are complex. The document simplifies the combinations and sets out four equations which detail the threshold levels for classifying a waste as ecotoxic on the basis of aquatic toxicity.

1) It should be determined if the waste contains any highly toxic substances with specific concentration limits (at present only PCBs/PCTs are considered)

- The use of biotests should be limited to cases where the hazards cannot be adequately determined from the composition of the waste, i.e.:
  - waste contains substances for which not aquatic toxicity data are available;
  - waste is an uncharacterised mixture.

The classification procedure is summarised in a Decision tree that is shown vol. 4 Annex 11.2.

Concerning the testing for aquatic toxicity the document proposes the EC test methods C2 (Acute toxicity for Daphnia) and C3 (Algal inhibition test). No methods are proposes for potential effects on the terrestrial environment.

The purpose of the guide of FNADE [FNADE 2003] is *"to give operators the practical tools to direct waste to suitable storage centres"*. This guidance document combines the LoW with the landfill criteria of EC Directive 1999/31/EC.

For mirror entries the guideline suggests a four steps assessment:

- Storable character of waste
- Control of hazardous character by documentation
- Control of hazardous character by an analytic approach documented by the waste producer
- Control of hazardous character by an environmental approach – property H14

Step 4 on "Control of hazardous character by an environmental approach" is of interest in this context and is applied if no data or information is available for the assessment steps 1-3.

The evaluation of property H14 in FNADE 2003 is based on the list of the Basel agreement and the OCED recommendations (Annex 11.3). In case of negative response the ecotoxicity tests are conducted in stages (first bacteria luminescence, then Daphnia acute toxicity (see Annex 11.4). If these standard ecotoxicity tests for acute toxicity by ISO 11348-3 and ISO 6341 do not yield the waste as hazardous, chronic toxicity tests based on French standards have to be applied in a second step. They include algae growth inhibition 7d, Cerio Daphnia dubia or Brachionus calyciflorus inhibition growth tests. Here the approach of [FNADE 2003] is more profound than others.

Tests on raw waste are optional. Further on three tests for water and three methods for ground soil are named in Appendix 3 (Annex 11.3); all of them are standard test methods. Appendix 4 of FNADE 2003 gives examples of results on ecotoxicity tests on different types of waste. Appendix 5 discusses the influences of the pH value of on the ecotoxicity tests.

Useful methodological information can be drawn from a study lead by the German Umweltbundesamt (UBA). The UBA has organised a European ring test evaluating the use of biological test systems for waste and waste eluates [DE 2007D]. The ring test was conducted as evaluation study of the EN 14735 "Characterisation of waste – preparation of waste samples for ecotoxicity tests". The purpose of this standard is to provide guidance on the taking of samples, transport, and storage of waste and to define preparation for the determination of testing either as raw wastes or water extracts from wastes. As a result a harmonised methodology standard should be available after the statistical assessment and normalisation process will be completed. The test was carried out with three different substrates (bottom ash from municipal waste incineration, contaminated soil, waste wood). For the ring test the following test systems were used:

- Bioassays for waste eluates:
  - Determination of the inhibitory effect on the light emission of *Vibrio fischeri* (Luminescent bacteria test) (EN ISO 11348)
  - Determination of the inhibition of the mobility of *Daphnia magna* Straus (Cladocera, Crustacea) - Acute toxicity test (EN ISO 6341)
  - Freshwater algal growth inhibition test with *Scenedesmus subspicatus* and *Pseudokirchneriella subcapitata (*EN ISO 8692)
- Bioassay for solid waste material:
  - Soil quality - Determination of the effects of pollutants on soil flora -Part 2: Effects of chemicals on the emergence and growth of higher plants (ISO/DIS 11269-2)
  - Soil quality - Effects of pollutants on earthworms (*Eisenia fetida*) - Part 1: Determination of acute toxicity using artificial soil substrate (ISO 11268-1)

The results show that the standard EN 14735 is in general suitable for ecotesting. The aquatic tests have proven to be practical and sensitive. Regarding the terrestrial tests the plant tests can be recommended. The test with earthworms is generally suitable but shows low sensitivity. Further questions concerning the details of testing and validity criteria remain to be further investigated.

6.2.2.4.3 Basel Convention

According to the Basel convention, the H-criterion 12 is analogous to H14 in the EU. The Basel Convention defines the criterion as:

"Substances or wastes which, if released, present or may present immediate or delayed adverse impacts to the environment by means of bioaccumulation and/or toxic effects upon biotic systems."

The definition of the Basel Convention, as clarified in the interim guidelines[29] does not differ systematically from that in the EU. Although the wording of 'if released' from the waste suggests considering exposures in assigning the criterion, the guideline confirms a hazard based approach for waste classification. Hence its intrinsic properties are to be determined without consideration of the potential for release. This corresponds to the classification approach for chemicals in the EU[30].

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[29] Secretariat of the Basel Convention: Interim guidelines on the Hazardous characteristics H12 Ecotoxic, published in September 2003. The guideline indicates that issues related to environmental hazards other than via the aquatic route, exposure via the food chain and endocrine disruption are not yet included and further work is needed on testing methods for waste. Furthermore, metals, for which the assessment of environmental risks is specific, are not considered either.

[30] There are very few exemptions with regard to the labelling of preparations (not classification!) of substances which are very firmly included in matrices, such as metal alloys.

In classifying waste according to the Basel Convention the first step is to consider the known composition and the second step is to conduct testing, when necessary. Testing of waste for environmental hazards is stated to require further elaboration in the respective guideline.

For substances which would be classified as acutely or chronically toxic according to the criteria of the globally harmonised system for classification and labelling of substances and preparations (GHS), concentration thresholds are defined above which a waste would be ecotoxic. For determining if the thresholds (de minimis values) are exceeded, the content of all substances with the respective classification has to be summed up. The concentration of substances with toxicity below 1 mg/l, in particular active substances used in plant protection products or biocide products, have to be considered after multiplication with respective factors.

Specific limits for POPs are foreseen in the future, in addition.

The approach to classify waste for H12 under the Basel Convention (which is analogous to H14 in the EU) is the same as for classifying substances and mixtures in the GHS implementing regulation in the EU.

For testing waste, it is proposed to start with a screening test and continue with more specific testing, if it is suspected that the waste is ecotoxic. The proposed tests include well established aquatic toxicity testing, such as tests with daphnia, as well as tests on terrestrial organism, which are less well established.

6.2.2.4.4 Classification "dangerous to the environment" according to Directive 67/548 and 99/45 as well as the CLP Regulation

General classification rules

The current EU system of classifying substances and preparations for the environment corresponds to that for human health hazards. The conventional method always has precedence over substance testing for bioaccumulative and persistent properties (R53) and testing may be performed for the aquatic toxicity in case this is regarded as more appropriate. Aquatic effects are regarded as additive and therefore, all substances contributing to the classification have to be considered, when they exceed the consideration thresholds of 0.1 or 1% w/w or any specific limit in Annex I of Directive 67/548/EEC.

R-phrases addressing environmental hazards in the current classification system are:

- R50-53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
- R50 Very toxic to aquatic organisms
- R51-53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
- R52 Harmful to aquatic organisms
- R53 May cause long-term adverse effects in the aquatic environment
- R52-53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment
- R54 Toxic to flora
- R55 Toxic to fauna
- R56 Toxic to soil organisms
- R57 Toxic to bees
- R58 May cause long-term adverse effects in the environment
- R59 Dangerous for the ozone layer.

The R-phrases R50 to R52 indicate the acute aquatic toxicity of a substance. The combination with R53 indicates that delayed effects can be expected due to the substance being bioaccumulative and/or persistent.

Concentration limits for H14 are

- Total concentration of ≥ 0.25% of one or more substances classified as dangerous for the environment with R phrases R50-53
- Total concentration of ≥ 2.5% of one or more substances classified as dangerous for the environment with R phrases R51-53
- Total concentration of ≥ 25% of one or more substances classified as dangerous for the environment with R phrases R52-53
- Total concentration of ≥ 0.1% of one or more substances classified as dangerous for the environment with R phrases R59

Although worded and organised in a slightly different way, the classification rules and criteria for environmental hazards are the same in current chemicals legislation (Directive 67/548/EEC and 99/45/EC) and the CLP Regulation. Differences are that

- the above listed R-phrases are not part of the CLP Regulation.
- the CLP Regulation contains an additional hazard class - the category chronic toxicity, category 4 - which is a so called safety net and allows classifying substances and mixtures which do not fulfil the classification criteria. This could be either because testing and therefore a comparison with the classification criteria is not possible or because other data suggests that classification and labelling would be required.

Harmonised classification

Annex I of Directive 67/548/EEC contains a list of approximately 3300 substances, for which the classification and labelling as well as specific concentration limits[31] have been agreed at the level of EU.

In Annex I of Directive 67/548/EEC (state: 29th ATP[32]), 36 substances have been assigned specific concentration limits for the environment. These are decreasing the generic limits by the factor 10, 100 etc. In a recent revision of the Dangerous Preparations Directive this has been included in the classification rules by relating the aquatic toxicity also below 0.1 mg/l to classification thresholds.

The harmonised classification of Annex I of Directive 67/548/EEC, as well as the specific concentration limits will be included in Annex IV of the CLP Regulation as so called 'minimum classification'. This means that the harmonised classification is to be applied as a minimum by the placer on the market of a substance and, if additional information suggesting a more stringent classification is available to him, he shall apply that, more stringent, classification.

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[31] Not for all substances in the Annex, a specific concentration limit has been developed. The specific concentration limits replace the generic once in the classification of a preparation. Hence, when exceeding the concentration in a preparation that is specified in Annex I, the classification of the preparation has to be derived accordingly. The specific limits are normally lower than the generic ones.

[32] Adaptation to technical progress

6.2.2.4.5 Biotests

Based on the results of the ring test in the context of CEN 14735 the biotest battery as shown in the table below has been proposed.

Table 18: Proposal for a test battery

Test system	Reference	Test organism	Endpoint	Toxicity criteria
Aquatic tests for waste eluate testing				
Determination of the inhibition of the mobility of *Daphnia magna* Straus (Cladocera, Crustacea) - Acute toxicity test	DIN EN ISO 6341	Daphnia magna	Immobilisation	10%
Freshwater algal growth inhibition test with *Scenedesmus subspicatus* and *Pseu-dokirchneriella subcapitata*	DIN EN ISO 8692	*Scenedesmus subspica-tus* or *Pseu-dokirchneriella subcapi-tata*	Growth	20%
Determination of the genotoxicity of water and waste water using the umu test	ISO 13829	*Salmonella*	Gen induction	$D_{min} \geq 2$
Terrestrial tests for solid waste testing				
Soil quality - Determination of the effects of pollut-ants on soil flora -Part 2: Effects of chemicals on the emergence and growth of higher plants	ISO 11269-2	*Brassica napus* (only one species)	Growth	30%
Soil quality - Avoidance test for determining the quality of soils and effects of chemicals on behav-iour -- Part 1: Test with earthworms (*Eisenia fetida* and *Eisenia andrei)*	ISO 17512-1 (2007a)	*Eisenia fetida/ Eisenia andrei*	Behaviour	20%
Solid contact test with *Arthrobacter globiformis*	DIN 38412-48 (2002) ISO 10871 (2008)	*Arthrobacter globiformis*	Dehydrogenase activity	20%

Remarks:
For the Extended Limit Test System only one plant species shall be tested.
The umu test is the only genotoxicity test suggested for the Extended Limit Test System, because of limited experi-ence with other genotoxic test systems. It might be replaced after additional scientific investigations.

6.2.2.4.6 Summary and conclusions

For the application of H14 most countries already refer to the risk phrases, the methods and the limit concentrations laid down in the chemicals legislation. Some countries also use the transport regulations (ADR) as reference.

The national approaches differ with regard to the scope and the methods applied. Some countries limit the application of H14 to risks to the aquatic environment (R50 to R53) and to the ozone layer (R59) because EU chemicals legislation provides no methods and limit val-ues for the risks to the terrestrial environment. Other countries include the terrestrial envi-ronment in their assessment.

The revised WFD links the criterion H14 with chemicals legislation. The current proposal for a CLP Regulation does not change the classification methodology or criteria for this property.

Hence, an update of the link to the CLP Regulation is possible without changes at content level.

The feedback from stakeholders highlighted that a harmonised application of H14 is highly dependant on the availability and reliability of standardised biotests. An important step in this direction is made with the EU ring test on the validation of EN 14735.

It can be expected that the classification of some waste types is influenced by the application of biotests. Those wastes are bottom ashes from the thermal treatment of municipal waste incineration (section 19 01), slags from combustion, metallurgy and other ashes currently listed in mirror entries (section 10 01) or oil-shale semi coke. Detailed results are expected from an ongoing study of the German UBA which will be finalised in summer 2009.

Table 19: Summary criterion H14

Topic	Existing Legislation	Proposal for a revised text / approach	Comments
Definition	"substances and preparations which present or may present immediate or delayed risks for one or more sectors of the environment"	"waste which presents or may present immediate or delayed danger to the environment "	The term "risk" does not seem to be appropriate because the property H14 is seen as an intrinsic property.
Link to chemicals legislation	Reference to DSD/DPD	Update of the link is part of the general update as described in chapter 6.2.1 of this report	
Test methods	No method for biotests available	Fixed test battery for bio-test	
Concentration limits / limit values	No value for biotests available	National approaches with evaluation period	

Table 20: Proposal for a test battery

Test system	Reference	Test organism	Endpoint	Toxicity criteria
Aquatic tests for waste eluate testing				
Determination of the inhibition of the mobility of *Daphnia magna* Straus (Cladocera, Crustacea) - Acute toxicity test	DIN EN ISO 6341	Daphnia magna	Immobilisa-tion	10%
Freshwater algal growth inhibition test with *Scenedesmus subspicatus* and *Pseudokirchneriella subcapitata*	DIN EN ISO 8692	*Scenedesmus subspicatus* or *Pseudokirchneriella subcapitata*	Growth	20%
Determination of the genotoxicity of water and waste water using the umu test	ISO 13829	*Salmonella*	Gen induction	Dmin ≥ 2
Terrestrial tests for solid waste testing				
Soil quality - Determination of the effects of pollut-ants on soil flora -Part 2: Effects of chemicals on the emergence and growth of higher plants	ISO 11269-2	*Brassica napus* (only one species)	Growth	30%
Soil quality - Avoidance test for determining the quality of soils and effects of chemicals on behav-iour -- Part 1: Test with earthworms (*Eisenia fetida* and *Eisenia andrei)*	ISO 17512-1 (2007a)	*Eisenia fetida/ Eisenia andrei*	Behaviour	20%
Solid contact test with *Arthrobacter globiformis*	DIN 38412-48 (2002) ISO 10871 (2008)	*Arthrobacter globiformis*	Dehydro-genase activ-ity	20%

Remarks:
For the Extended Limit Test System only one plant species shall be tested.
The umu test is the only genotoxicity test suggested for the Extended Limit Test System, because of limited experience with other genotoxic test systems. It might be replaced after additional scientific investigations.

Presently, no sufficiently broad data basis is available to determine limit values for biotesting according to H14. It is proposed to include the test battery including the scientifically derived and test specific toxicity criteria as binding test method in the revised LoW (no link to chemicals legislation is possible at this point). The revised LoW shall require that Member States fix own limit values for the hazard classification based on biotests or alternatively apply a yes/no decision (waste shows effect in limit tests/shows no effect in limit tests). The results in the Member States shall be communicated to the European Commission. A review of these provisions should be done after three years.

6.2.3 Measure 3: Generic concentration limits

The instrument of generic concentration limits is maintained for the classification of waste as hazardous waste as it is in the baseline scenario. In addition to the generic concentration limits provided in chemicals legislation generic concentration limits are also provided in the LoW. In contrast to chemicals legislation the limit values in the revised LoW are aggregated per H-criterion where applicable. Article 2 of the LoW is maintained in principle. It is adapted according to the generic concentration limits of CLP (Annex I of the CLP Regulation) and the amended list of H-criteria of the revised WFD. The list of substance properties in Article 2 of the LoW is amended in order to reflect the hazard classes and hazard statements of the CLP regulation. It is replaced by the following list below.

Table 21: Proposal for an updated Article 2 of the LoW

H-criterion	Specification	Additivity
H3 Flammable	flash point ≤ 55ºC,	
H6 Toxic	substances classified as acute tox. Cat.1 or acute tox. Cat.2 or STOT single 1 (T+) at a concentration ≥ 0,1 %, substances classified as acute tox. Cat.3 or STOT single 1 (T) or STOT rep. Cat.1 at a concentration ≥3%,	Yes
H5 Harmful	substances classified as acute tox. Cat. 4 or STOT rep. 2 at a concentration ≥ 25 % (),	Yes (incl. H7)
H8 Corrosive	substances classified as skin corr. Cat.1A at a concentration ≥ 1%, corrosive substances classified as skin corr. 1B at a concentration ≥ 5%,	Yes (incl. H4)
H4 Irritant	substances classified as eye damaging cat.1 at a concentration ≥ 3%, substances classified as eye irrit. Cat. 2 or skin irrit. Cat.2 or STOT single Cat.3 at a concentration ≥ 10%,	Yes (incl. H8)
H7 Carcinogenic	substances classified as carcinogenic cat. 1A or 1B at a concentration ≥ 0,1 %, substances classified as carcinogenic cat. 2 at a concentration ≥ 1 %,	
H10 Reprotoxic	substances classified as reprotoxic cat. 1A or 1B at a concentration ≥ 0,3% substances classified as reprotoxic cat. 2 at a concentration ≥ 3%	
H11 Mutagenic	substances classified as mutagenic cat. 1B at a concentration ≥ 0,1 %, substances classified as mutagenic cat. 2 or STOT single cat. 2 at a concentration ≥ 1 %,	
H13 Sensitising	substances classified as Resp. sens. Cat.1 or Skin. sens Cat.1 at a concentration ≥ 1 %,	

This approach reduces the amendments in the LoW to a minimum and keeps the basic principle of the list.

The new chemicals legislation could lead to an increase of wastes that are classified as hazardous because of the amended generic concentration limits for substances covered by the H-criteria H4 “Irritant” and H10 “Toxic for reproduction”. The impacts for H1 “Explosive”, H2 “Oxidising”, H3-A “Highly Flammable”, H3-B “Flammable” and for H5 “Harmful” are unclear because a direct “translation” to CLP is not possible and for H12 “Sensitizing” because this is a criterion newly introduced by the revised WFD. No impact will result for H8 “Corrosive, H11 “Mutagenic” and H14 “Ecotoxic”. A different number of substances will be covered by those CLP classifications which correspond most closely to DSD categories “very toxic” and “toxic” because of different LD_{50}- or LC_{50}-cut-off values related to the individual categories (see section 1 of this document).

Summarising it is proposed to amend the text of Art. 2 of the LoW by replacing it by Table 21.

6.2.4 Measure 4: Specific limit values

In chemicals legislation specific limit values are used for substances where specific properties shall be considered in the classification process which are not reflected in the generic concentration values appropriately. The specific concentration limits are partly higher and partly lower than the generic concentration limits.

Measure 4 updates the existing provisions by a link to Annex VI of the CLP Regulation[33] and to the European Classification and Labelling Inventory. This can be done by amending Note 2 of Annex III of the revised WFD by the text: Where relevant the limit values according to Annex VI of the CLP Regulation and the European Classification and Labelling Inventory shall apply.

Since the European Classification and Labelling Inventory is not yet established no further appraisal of administrative efforts can be given. Annex I of Directive 67/548/EEC contains 525 substances with specific concentration limits. These concentration limits don't relate to physical hazards, but only to properties rendering a substance dangerous to the environment or human health. For 36 substances classified as dangerous to the environment, specific concentration limits have been included in Annex I[34]. One substance is classified as dangerous for the ozone layer (tetrachloromethane). 150 of the substances which have a specific classification limit in the Annex are classified with R53 alone or in combination with R50, R51 or R52. For 36 substances the specific limit relates to the environmental classification as such, for 100 substances, it is set for a human health property. Among these,

5 are classified as a category 1 CMR as most stringent classification

24 are classified as a category 2 CMR as most stringent classification

16 are classified as a category 3 CMR as most stringent classification

The specific limit values of Annex I of the DSD are sometimes higher, sometimes lower and sometimes the same as the generic concentration limits of the LoW. The following section provides exemplary cases. Additionally the waste specific limit values as described in chapter 0 are to be considered for cases where limit values of chemicals legislation are not appropriate for waste management purposes.

[33] Annex I of the DSD will be repealed with EiF of the CLP Regulation and it will include in its Annex VI Table 3.1 the harmonised classification of substances based on the GHS criteria (translation of the Annex I DSD) and in its Table 3.2 the existing harmonised classification from the current Annex I of the DSD.

[34] The 2nd ATP to the DPD introduced the M-factor for highly environmentally toxic substances.

Example: potassium nitrite, relevant for example as food preservative

- H4: Not classified as irritant.
- H5:Not classified as harmful
- H6: Classified as toxic T; R25; concentration level 3%
- H7: Not classified as carcinogenic,
- H8: Not classified as corrosive.
- H10: Not classified as reprotoxic,
- H11: Not classified as mutagenic
- H14: Classified as ecotoxic; N R50, concentration level 25 %

Specific concentration level: 1%

generic concentration level	specific concentration level
3%	1%

Example: hydrogen peroxide solution, relevant for example for pulp- and paper-bleaching

- H4: Not classified as irritant.
- H5:Clasified as harmful Xn; R20, concentration level 25%
- H6: Not classified as toxic.
- H7: Not classified as carcinogenic,
- H8: Not classified as corrosive C, R35 concentration level 1%.
- H10: Not classified as reprotoxic,
- H11: Not classified as mutagenic
- H14: Not classified as ecotoxic;

Specific concentration level: 5%

generic concentration level	specific concentration level
1%	5%

Example: Cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), mixture of cadmium sulphide with zinc sulphide (xCdS.yZnS), mixture of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in Annex I of the DSD. (Those compounds specified elsewhere in Annex I are for example cadmium diformate; cadmiumformate, cadmium cyanide, "cadmiumhexafluorosilicate(2-); cadmium fluorosilica, cadmium fluoride, cadmium iodide, cadmium chloride, cadmium sulphate, cadmium sulphide). Relevant in a broad range of waste types where cadmium compounds are or have been used e.g. as pigment or as stabiliser (plastics), waste batteries and accumulators and as contamination e.g. of zinc.

- H4: Not classified as irritant.
- H5:Clasified as harmful Xn; R20/21/22, concentration level 25%
- H6: Not classified as toxic.
- H7: Not classified as carcinogenic,
- H8: Not classified as corrosive.
- H10: Not classified as reprotoxic,
- H11: Not classified as mutagenic
- H14: Classified as ecotoxic; R50-53, concentration level 25 %

Specific concentration level: 0.01 %

generic concentration level 25%	specific concentration level 0.1%

Example: arsenic compounds, with the exception of those specified elsewhere in Annex I of the DSD; relevant for example for waste wood/ wood preservatives

- H4: Not classified as irritant.
- H5:Not classified as harmful
- H6: Classified as toxic T; R23/25; concentration level 3%
- H7: Not classified as carcinogenic,
- H8: Not classified as corrosive.
- H10: Not classified as reprotoxic,
- H11: Not classified as mutagenic
- H14: Classified as ecotoxic; N R50-53, concentration level 25 %

Specific concentration level: 0.1%

generic concentration level 3%	specific concentration level 0.1%

Example: chromium (VI); used in surface treatment of metals

- H4: Not classified as irritant.
- H5:Not classified as harmful
- H6: Classified as very toxic, T+; R26 concentration level 0.1% and toxic T; R24/25-48/23, concentration level 3%
- H7: Classified as carcinogenic, Carc. Cat. 1; R45 concentration level 0.1%
- H8: Classified as corrosive. C; R35 concentration level 1%
- H10: Classified as reprotoxic, Repr. Cat. 3; R62 concentration level 5%
- H11: Classified as mutagenic Muta. Cat. 2; R46 concentration level 0.1%
- H14: Classified as ecotoxic; N R50-53, concentration level 25 %

Specific concentration level: 0.1%

generic concentration level 0.1%	specific concentration level 0.1%

Example: tributyltin compounds, with the exception of those specified elsewhere in Annex I of the DSD. Relevant for example for waste paint or varnish, waste from removal of paints and scrap where used as wood preservation, antifouling pesticide or in marine paints.

- H4: Classified as irritant. Xi; R36/38; concentration level 20%
- H5:Clasified as harmful Xn; R21, concentration level 25%
- H6: Classified as toxic T; R25-48/23/25; concentration level 3%
- H7: Not classified as carcinogenic,
- H8: Not classified as corrosive.
- H10: Not classified as reprotoxic,
- H11: Not classified as mutagenic
- H14: Classified as ecotoxic; N R50-53, conc. level 25 %

Specific concentration level: 0.25%

generic concentration level 3%	specific concentration level 0.25%

Example: sulphuric acid

- H4: Not classified as irritant.
- H5:Not classified as harmful
- H6: Not classified as toxic.
- H7: Not classified as carcinogenic,
- H8: Classified as corrosive. C; R35 concentration level 1%
- H10: Not classified as reprotoxic,
- H11: Not classified as mutagenic
- H14: Not classified as ecotoxic;

Specific concentration level: 5%

generic concentration level 1%	specific concentration level 5%

Example: hydrochloric acid

- H4: Classified as irritant Xi, R37 concentration level 20%
- H5:Not classified as harmful
- H6: Not classified as toxic.
- H7: Not classified as carcinogenic,
- H8: Classified as corrosive. C; R34 concentration level 5%
- H10: Not classified as reprotoxic,
- H11: Not classified as mutagenic
- H14: Not classified as ecotoxic;

Specific concentration level: 10%

generic concentration level 5%	specific concentration level 10%

Example Benzo(a)pyrene (CAS-nr 50-32-8)

Information on classification of the substance is found in 67/548/EEC.

- H4: Not classified as irritant.
- H5-6: Not classified as harmful or toxic.
- H7: Classified as carcinogenic, cat. 2: R 45, concentration level 0.1 %
- H8: Not classified as corrosive.
- H10: Classified as reprotoxic, cat. 2; R60-61, concentration level 0.5 %
- H11: Classified as mutagenic, cat. 2; R46, concentration level 0.1 %
- H14: Classified as ecotoxic; R50-53, concentration level 0.25 %

Specific concentration level: 0.01 %

generic concentration level 0.1%	specific concentration level 0.01%

By considering specific concentration limits it is possible to take account of substance properties which are not appropriately reflected in the generic concentration limits. This result in improved risk management measures e.g. in order to avoid carry hazardous substances in recycled products in the course of recycling activities and/or to avoid negative environmental consequences.

The overall administrative efforts for screening the Annex of the CLP Regulation and the European Classification and Labelling Inventory is estimated to be small compared to the efforts which are necessary to identify a substance in a waste and to determine its concentration.

At the same time consideration of specific limit values for wastes where knowledge about the composition is often fragmented leads to high efforts.

Measure 4 is combined in this scenario 2 with measure 6 and especially the Generic Characterisation Approach as described in chapter 6.2.6.3. It includes the proposal to apply simplified characterisation approaches where appropriate.

The combination of both measures makes it possible to take account of substance specific properties and to limit at the same time the analytical efforts for the characterisation of waste.

Concluding it is proposed to amend Note 2 of Annex III of the revised WFD by adding the text: "Where relevant the limit values according to Annex VI of the CLP Regulation and the European Classification and Labelling Inventory shall apply."

6.2.5 Measure 5: Waste-specific concentration values

In addition to the specific concentration limits as used in chemicals legislation this measure introduces concentration limits that are specific for the management of waste. Measure 5 aims at filling gaps where chemicals legislation does not reflect specific waste management situation sufficiently. Several POPs are included in Annex I of the DSD, but do not have a specific classification limit. Other substances which are relevant in the context of waste management but not in the context of the DSD like PCDD/F are not included in Annex I at all.

6.2.5.1 Background - Concentration limits for POP containing waste

Annex IV of the **POP Regulation** as amended by Regulation 1195/2006 lists persistent organic pollutants and assigns concentration limit values. For wastes where those ELV are exceeded the POP regulation requires specific treatment, recovery or disposal processes for the disposal of those wastes.

The European **Waste Shipment Regulation** 1013/2006 provides for specific requirements for shipment of hazardous waste

- between Member States, within the Community or with transit through third countries;
- imported into the Community from third countries;
- exported from the Community to third countries;
- in transit through the Community, on the way from and to third countries.

  The export to non OECD countries is prohibited according to the Waste Shipment Regulation.

Potentially additional regulations might apply resulting from national systems for supervision and control of shipment of waste within a Member State according to Article 33 of the Waste Shipment Regulation.

In the international context the “Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal” provides a list of wastes (Annex VIII) that are classified as hazardous wastes as long as it is not proven that the waste does not fulfil the hazard criteria of Annex III of the Basel Convention. Relevant entries are for example [Pohlmann 2006]:

Wastes potentially contaminated or containing PCDD/PCDF:
A1100 Dusts and residues from gas cleaning systems of copper smelters
(A1150 Precious metal ash from incineration of printed circuit boards not included on list B *further information is necessary)*
(A2040 Waste gypsum arising from chemical industry processes, when containing annex I constituents to the extent that it exhibits an Annex III hazardous characteristic *further information is necessary*)
(A2060 Coal fired power plant fly-ash containing annex I substances in concentrations sufficient to exhibit Annex III characteristics *further information is necessary*)
A3010 Waste from the production or processing of petroleum coke and bitumen
A4110 Wastes that contain, consist of are contaminated with any of the following:
Any congener of polychlorinated dibenzo-furan,
any congener of polychlorinated dibenzo-dioxin
A4160 Spent activated carbon not included on list B

Wastes potentially contaminated or containing POPs pesticides:
A3090 Waste leather dust, ash, sludges and lours when containing hexavalent chromium compounds or biocides
A3110 Fellmongery wastes containing hexavalent chromium compounds or biocides or infectious substances
A4130 Waste packages and containers containing Annex I substances in concentrations sufficient to exhibit Annex III hazard characteristics
A4140 Waste consisting of or containing off specification or outdated chemicals corresponding to Annex I categories and exhibiting Annex III hazard characteristics

Wastes potentially contaminated or containing PCB
A3040 Waste thermal (heat transfer) fluids – *to be discussed in relation of A3180*
A3120 Fluff – light fraction from shredding
(A3180 *only needs adaptation if a new classification limit will be adopted)*

Within the context of the Basel Convention technical guidelines have been elaborated and are still under further development that provide for the environmentally sound management of wastes “consisting of, containing or contaminated with persistent organic pollutants (POPs)”. The technical guidelines provide a framework for addressing issues referred to in Article 6, paragraph 2 of the Stockholm Convention.

Existing concentration limits

The need to communicate information about the properties of a waste via the classification as “hazardous” and use of the asterisk of the waste code might result from different contexts:

a) Requirements related to storing of waste,

b) Requirements related to transport of waste,

c) Requirements related to treatment, recovery and final disposal of waste including the reclamation of components of the waste and the use of components of the waste in resulting recycling products,

d) Requirements related to occupational health and safety.

Storage and transport

The "European Agreement concerning the international carriage of dangerous goods by road" (ADR) provides in ANNEX A (General Provisions and Provisions concerning Dangerous Substances and Articles) that 2,3,7,8-TCDD in concentrations considered highly toxic (…) shall not be accepted for carriage [ADR Annex A PART 2 CHAPTER 2.2.61.2.2] (same as specific provision 614 of ADR). The approach taken with the ADR regime differs from the H-criteria approach of the LoW and is differentiated by effects on humans or animals (see table below).

Table 22: ADR requirements of chapter 2.2.61

	Oral toxicity LD50 (mg/kg)	Dermal toxicity LD50 (mg/kg)	Inhalation toxicity by dusts and mists LC50 (mg/l)
Highly toxic	≤5	≤ 50	≤0.2
Toxic	> 5 and ≤ 50	> 50 and ≤ 200	> 0.2 and ≤ 2
Slightly toxic	> 50 and ≤ 300	> 200 and ≤1 000	> 2 and ≤ 4

No general limit values applicable to PCDD/F or POP pesticides containing waste are provided in ADR.

In some Member States differing provisions exist like the German requirements laid down in the GGVS as shown in the table below.

Table 23: Example of transport requirements in Germany

Transport of materials is prohibited if they contain more than the following concentrations of substances

- >1 µg/kg (ppb) PCDD/F of letter a or d below, or
- >5 µg/kg (ppb) PCDD/F of letter a+b or d+e below, or
- >100 µg/kg (ppb) PCDD/F as sum of letter a to c below
  a. 2,3,7,8-Tetrachlordibenzop-dioxin (TCDD),
  1,2,3,7,8-Penta-CDD,
  2,3,7,8-Tetrachlordibenzofuran (TCDF),
  2,3,4,7,8-Penta-CDF,
  b. 1,2,3,4,7,8-Hexa-CDD,
  1,2,3,7,8,9-Hexa-CDD,
  1,2,3,6,7,8-Hexa-CDD,
  1,2,3,7,8-Penta-CDF,
  1,2,3,4,7,8-Hexa-CDF,
  1,2,3,7,8,9-Hexa-CDF,
  1,2,3,6,7,8-Hexa-CDF,
  2,3,4,6,7,8-Hexa-CDF,
  c. 1,2,3,4,6,7,8-Hepta-CDD,
  1,2,3,4,6,7,8,9-Octa-CDD,
  1,2,3,4,6,7,8-Hepta-CDF,
  1,2,3,4,7,8,9-Hepta-CDF,
  1,2,3,4,6,7,8,9-Octa-CDF,
  d. 2,3,7,8-Tetrabromdibenzop-dioxin (TBDD),
  1,2,3,7,8-Penta-BDD,
  2,3,7,8-Tetrabromdibenzofuran (TBDF),
  2,3,4,7,8-Penta-BDF,
  e. 1,2,3,4,7,8-Hexa-BDD,
  1,2,3,7,8,9-Hexa-BDD,
  1,2,3,6,7,8-Hexa-BDD,
  1,2,3,7,8-Penta-BDF.

[Neufassung der Gefahrgutverordnung Straße und Eisenbahn vom 24. November 2006, Anlage 2 Abweichungen von den Teilen 1 bis 7 des ADR und RID und den Teilen 8 und 9 des ADR für innerstaatliche Beförderungen]

Recovery and disposal operations

Annex IV of the POP regulation as amended describes concentration levels agreed on European and international level that triggers the application of specific waste disposal techniques. Regarding PCDD/F this value is 15 µg/kg (ppb). For other POPs the limit value is set at 50 mg/kg (ppm).

In order to communicate along the waste management chain (waste producer to final disposal or recovery) that the waste needs specific attention it can be concluded that the concentration limit that render waste hazardous in the LoW should not be above these values.

For a number of recovery activities lower concentration levels may be required. A possible example is the use of waste on soil (e.g. sewage sludge). The Stockholm Convention Precautionary Principle requires that the background concentration of POP should not be increased from the use of POP waste. This suggests that the concentration of POP in wastes used in this recovery path should not be above 0.001 to 0.1 µg/kg (ppb) for PCDD/F and 0.01 to 0.1 mg/kg (ppm) for pesticides (= background concentrations [BIPRO p. 334]). However the precautionary principle of the Stockholm Convention is not reflected in the mechanism of H-criteria according to the LoW.

The POP regulation aims, inter alia, at preventing POPs from wastes to be transferred into new products. It requires that POP from wastes must not be recovered, recycled, reclaimed or re-used [Article 7.3]. Examples of product for which transfer of POPs in the course of recycling activities could be an issue are secondary construction materials or secondary plastics. In order to put this general provision in concrete terms recycling operations and product related concentration limits must be considered. Corresponding data on European level is not known.

Human health effects

According to [BIPRO p.350] an appropriate limit value resulting from human health risk considerations is at 1 µk/kg (ppb) for PCDD/F and 50 mg/kg (ppm) for POP pesticides and other POPs [BIPRO p. 351]. Concentration limits in the context of occupational health and safety regulations are usually related to concentrations of hazardous substances in air (or sometimes liquids). No limit values related concentrations of PCDD/F, POP pesticides or DDT in solid materials are known.

Chemicals legislation

The DSD does not provide specific concentration limits for PCDD/F, POP pesticides and DDT. Where no specific concentration limits are available generic concentration limits would apply, which is of 0.1% (1000 mg/kg or 1000 ppm).

6.2.5.2 PCDD/F

PCDD/F have carcinogenic properties[35] according to CLP proposal[36]. It has been stressed in several discussions and stakeholder contributions that the generic value does not take waste management related environmental protection and human health risks adequately into account. Missing specific limit values in chemicals legislation have been attributed in these comments inter alia to the fact that PCDD/F is not intentionally produced and thus is not an issue for product related classification and labelling legislation like the DSD.

Based on consideration of aquatic toxicity concentration limits to classify waste contaminated with POPs as hazardous can be appraised [pers. Com. EC 2007].

Table 24: SUBSTANCE PROFILES FOR THE PERSISTENT ORGANIC POLLUTANTS

LC50*	NOEC*	Hazardous if	
> 10 µg/l	> 1 µg/l	> 0.025%	250 mg/kg
> 1 µg/l	> 0.1 µg/l	> 0.0025%	25 mg/kg
> 0.1 µg/l	> 0.01 µg/l	> 0.00025%	2.5 mg/kg
> 0.01 µg/l	> 0.001 µg/l	> 0.000025%	0.25 mg/kg
> 0.001 µg/l	> 0.0001 µg/l	> 0.0000025%	25 µg/kg

(data from: http://www.chem.unep.ch/pops/indxhtms/asses6.html#SUB)

Exposure of fish to dioxins and furans results in a delayed mortality that can continue many days post-exposure. Rainbow trout exposed to 2,3,7,8-TCDD and to 2,3,7,8-TCDF for 28 days, followed by a 28 day depuration period had a 56-day LC50 of 46 pg/L for TCDD, and a NOEC for TCDD based on growth and mortality below the lowest exposure concentration of 38 pg/L. The 56-day NOEC for TCDF was calculated to be 1.79 ng/L for mortality and 0.41 ng/L for growth. Mortality and behavioural changes such as lethargic swimming, feeding inhibition and lack of response to external stimuli continued after the 28 day exposure period ended. Early life stages of fish are very sensitive to the effects of dioxins, furans, and PCBs. Parts per trillion concentrations of these structurally related chemicals in lake trout and rainbow trout eggs exhibit toxicity through sac fry mortality associated with yolk sac edema and hemorrhages.

LC50*	NOEC*	Hazardous if	
	> 0.0001 µg/l	> 0.0000025%	25 µg/kg

Since this value is not based on consideration of human toxicological and/or occupational health aspects it can be concluded that an appropriate limit value should be below the above shown value. However, no such value is established on European level yet. On national level the value of 10µg/kg (TEQ, dm) is established e.g. in the Austrian Hazardous Waste Ordinance.

35 Carc.Cat.1; R45 (May cause cancer) according to DSD Directive 67/548/EEC respectively H350 (May cause cancer)

36 Status: Council Proposal

Direct impacts of the policy option

PCDD/F are not produced intentionally. They can form in different processes. The most prominent processes are high temperature processes like combustion processes or thermal production processes (e.g. power plants, waste incineration, metallurgical industry, cement production).

New formation of PCDD/F occurs in thermal processes predominantly in a temperature frame of 200 –450°C and is supported if certain catalysts (e.g. copper) or chlorine precursors are present in the feed material.

A rough appraisal of wastes with PCDD/F concentrations above 10 µg TEQ/kg[37] state amount of ~172,000 t/y (see vol. 4 Annex 22). An additional analysis of mirror entries based on data delivered by 10 Member States performed in the course of this study showed that a large portion of the affected waste is classified as always hazardous wastes. No effects from setting a limit value are expected for those wastes. The degree of detail of the available data (amount of waste per waste code + concentration of PCDD/F in these wastes) is not sufficient to calculate precise amounts. A rough estimation based on the available data leads to an amount between 50 000 to 90 000 t/y might be affected.

The classification of waste as hazardous waste has consequences regarding monitoring and control of waste transport. Quantification of the effect would require information about the number of transport activities which are not available.

Disposal and/or recovery installations might be affected depending on whether the permit includes potentially changed waste codes or whether they must apply for an extension of the existing permit.

Further detailing of the magnitude of this impact would require a data basis that describes details of the permits on European level which is not available.

Based on the appraisal of affected waste amounts it can be estimated that with this measure additional 2 to 5 kgTEQ/y of PCDD/F will be controlled by the more stringent regime for hazardous wastes.

6.2.5.3 Other POP waste

As discussed for PCDD/F the policy option for setting limit values for other POPs is based on the principle that the LoW does not set limit values on other ground than intrinsic properties of the waste. Thus no link between POP regulation and LOW is to be set.

The DSD includes specific concentration values for PCB of 0,005 % ≤ C < 0,25 %: Xn; R33.

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37 BIPRO 2005

Based on consideration of aquatic toxicity [EC pers.com. 2008] provided the following calculations:

Table 25: SUBSTANCE PROFILES FOR THE PERSISTENT ORGANIC POLLUTANTS

LC_{50}*	NOEC*	Hazardous if	
> 10 µg/l	> 1 µg/l	> 0.025%	250 mg/kg
> 1 µg/l	> 0.1 µg/l	> 0.0025%	25 mg/kg
> 0.1 µg/l	> 0.01 µg/l	> 0.00025%	2.5 mg/kg
> 0.01 µg/l	> 0.001 µg/l	> 0.000025%	0.25 mg/kg
> 0.001 µg/l	> 0.0001 µg/l	> 0.0000025%	25 µg/kg

*** Data from: http://www.chem.unep.ch/pops/indxhtms/asses6.html#SUB**

ALDRIN: The 96-h LC50 values range from **2.2**-53 **µg/L** for fish.

LC50*	NOEC*	Hazardous if	Resulting limit value
> 1 µg/l		> 0.0025%	25 mg/kg

CHLORDANE: The acute toxicity of chlordane to aquatic organisms is quite variable, with 96-hour LC50 values as low as **0.4 µg/L** for pink shrimp.

LC50*	NOEC*	Hazardous if	Resulting limit value
> 0.1 µg/l		> 0.00025%	2.5 mg/kg

DDT: DDT is highly toxic to fish, with 96-hour LC50 values in the range of **0.4 µg/L** in shrimp to 42 µg/L in rainbow trout.

LC50*	NOEC*	Hazardous if	Resulting limit value
> 0.1 µg/l		> 0.00025%	2.5 mg/kg

DIELDRIN: The acute toxicity of dieldrin is quite variable for aquatic invertebrates, with insects being the most sensitive group (values range from **0.2**-40 **µg/L**). It is highly toxic to most species of fish tested in the laboratory (values range from **1.1**-41 µg/L).

LC50*	NOEC*	Hazardous if	Resulting limit value
> 0.1 µg/l		> 0.00025%	2.5 mg/kg

NB: Borderline case, it could be also

LC50*	NOEC*	Hazardous if	Resulting limit value
> 1 µg/l		> 0.0025%	25 mg/kg

ENDRIN: Endrin is highly toxic to fish, with most **LC50 values below 1.0 µg/L**. Sheepshead minnows embryos exposed for 23 weeks to 0.31 and 0.72 µg/L hatched early, and all those exposed to 0.72 µg/L died by the ninth day of their exposure, while those exposed at 0.31 µg/L were initially stunted and some died. The reproductive ability of the survivors of the 0.31 µg/L was impaired. **No significant effects were observed at an exposure concentration of 0.12 µg/L**. The lowest observed adverse effect level (LOAEL) for aquatic organisms was 30 ng/L over 20 days for reproduction in mysid shrimp.

LC50*	NOEC*	Hazardous if	Resulting limit value
	> 0.1 µg/l	> 0.0025%	25 mg/kg
> 0.1 µg/l		> 0.00025%	2.5 mg/kg

HEXACHLOROBENZENE: HCB is unlikely to cause direct toxicological effects in aquatic animals at or below saturation concentrations (approximately 5 µg/L) in water. At an exposure concentration of 4.8 µg HCB/L for 32 days, there was no observed effect on embryonic through juvenile stages in developing fathead minnows (*Pimephales promelas*) giving a NOEC of 4.8 µg/L. The caldoceran *Daphnia magna*, the amphipods *Hylella azeteca*, and *Gammarus lacustris*, the annelid worm *Lumbricus variegatus,* and the fathead minnow *Pimephales promelas* were exposed to HCB at saturation concentration (5 µg/L) for 68 days. No effects on survival, growth or reproduction were observed.

=> ***no data allowing calculating a proper NOEC or LC50 on aquatic toxicity***

HEPTACHLOR: no data on aquatic toxicity.

MIREX: Crustaceans are the most sensitive aquatic organisms, with larval and juvenile stages being the most sensitive. Delayed mortality is typical of mirex poisoning in crustaceans. Larval crabs exposed to **0.1** and 10 **µg/L** did not exhibit any adverse effects on survival for 5 days after hatching. Delayed mortality then occurred at the 1 and 10 µg/L exposure levels. Mirex is also toxic to fish and can affect fish behaviour.

LC50*	NOEC*	Hazardous if	Resulting limit value
> 1 µg/l	> 0.1 µg/l	> 0.0025%	25 mg/kg

TOXAPHENE: In general, toxic effects have been observed only at levels much higher than the recommended usage level. Toxaphene is highly toxic, with 96-hour **LC50** values in the range of **1.8 µg/L** in rainbow trout to 22 µg/L in bluegill. Brook trout exposed to toxaphene for 90 days experienced a 46% reduction in weight at **0.039 µg/L**, the lowest concentration tested. Egg viability in female trout was significantly reduced upon exposure to a concentration of 0.075 µg/L or more. Long term exposure to 0.5 µg/L reduced egg viability to zero.

LC50*	NOEC*	Hazardous if	Resulting limit value
> 1 µg/l		> 0.0025%	25 mg/kg
	> 0.01 µg/l	> 0.00025%	2.5 mg/kg

NOEC > 0.01 µg/l => 0.00025% => 2.5 mg/kg or lower as NOEC is < 0.039 µg/l but without additional information.

No data about appropriate values with the background of **human toxicity** are available. Thus it would be justifiable to fix lower limit values than those developed above. However, no applicable data basis is available for doing so. The environmental impact will be that the affected wastes will be subject to the more stringent control regime for hazardous wastes. However, no data about potentially affected waste amounts similar to those about PCDD/F-contaminated wastes are available for the above mentioned POPs.

6.2.5.4 Summary of results

Concluding it is proposed to include waste specific limit values in the LoW as shown in the table below. These values shall be subject to review when new scientific ground is available to determine appropriate values with the background of human toxicology.

Table 26: Proposed limit values specific for waste management purposes

Substance	Hazardous waste if concentration of the substance is above…
PCDD/F	10 µg/kg
TOXAPHENE	2.5 mg/kg
MIREX	25 mg/kg
ENDRIN	2.5 mg/kg
DIELDRIN	2.5 mg/kg
DDT	2.5 mg/kg
CHLORDANE	2.5 mg/kg
ALDRIN	25 mg/kg

6.2.6 Measure 6: Improving classification for specific substances and waste types

With this measure the existing reference in Annex III of the revised WFD regarding testing of waste[38] is replaced by referencing to a specific document about characterisation of waste, which is to be elaborated. This document comprises

- the overall approach for the characterisation of waste,
- link to the REACH document that replaces Annex V of the DSD,
- link to appropriate CEN standards on the analysis of waste,
- approaches for the characterisation of waste that takes specific waste management situation into account.

Further details are presented in the following sections.

The outcome from the stakeholder survey (see volume 1 of this report) showed that no quantitative information is available on the frequency of laboratory analysis in the course of the characterisation of waste as hazardous or non-hazardous. However, expert interviews and statements from stakeholders revealed a relatively homogeneous picture saying that in practice laboratory analysis is only done as a last resort. Other steps that avoid financial efforts for analysing waste are preferred including characterisation of waste as hazardous even in cases where this is not proven. These approaches are taken up in the proposals for an overall testing strategy as shown in section 6.2.6.2.1 of this report.

6.2.6.1 Measure 6a: Minimising the number of entries where individual characterisation of the waste is necessary

Presently the LoW comprises more than 330 mirror entries[39]. For each of these entries a decision must be taken whether it is a hazardous waste or a non-hazardous waste and an appropriate basis for that decision must be elaborated. At the same time experience from the application of the LoW from several years show that in practise many of the respective wastes are always hazardous or always non-hazardous. The efforts for characterisation of the waste could be reduced when the entries for those wastes are not mirror entries but absolute hazardous or absolute non-hazardous entries.

This could be achieved by different approaches:

[38] "Test methods: The methods to be used are described in Annex V to Directive 67/548/EEC and in other relevant CEN-notes."

[39] The remaining entries are called "absolute entries" being either hazardous or non-hazardous entries without mirror entries. The number of identified mirror entries might differ depending on the methodology of counting.

a) A new type of entry in addition to “absolute entries” and “mirror entries” can be developed comprising “usually hazardous waste entries”. A waste which is on this list can still be characterised as non-hazardous waste when analysis shows that it does not have hazardous properties (opt out).
Such a list is already applied in some Member States. The textbox below shows the example from Sweden.

1. Antifreeze fluids in cases when contents of ethylene glycol can not be excluded [16 01 14*].
2. Fluff-light fraction and dust from shredding of end-of-life vehicles or discarded electrical and electronic equipment [19 10 03*].
3. Treated / impregnated wood [for example 03 01 04*, 17 02 04*, 19 12 06*, 20 01 37*]
4. Fly ash from waste incineration [19 01 13*].
5. Construction and demolition wastes which presumably may contain coal tar (for example “tar paper” used as wind shielding wall-/roof lining, tar containing joint sealants, wear resistance layers and moist barriers in roofs, floors, foundations and bathrooms) [for example 17 01 06*, 17 06 03*, 17 09 03*].
6. Bituminous mixtures containing coal tar [17 03 01*]. If, however, the contents of USEPA 16 PAH are less than 300 ppm or the contents of USEPA 7 PAH are less than 100 ppm, then the waste normally may be classified as non-hazardous [the carcinogenic property of the waste is presumed to be more determining for the classification than the ecotoxic property]. USEPA 16 PAH includes: Acenaphthene, Acenaphthylene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene, Fluorene, Indeno(1,2,3-cd)pyrene, Naphthalene, Phenanthrene and Pyrene. USEPA 7 PAH includes: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene, and Indeno(1,2,3-cd)pyrene. (ppm = parts per million)
7. Casting cores and moulds containing phenols (resols) as a binder [10 09 05*, 10 09 07*, 10 10 05*, 10 10 07*].
8. Waste blasting materials from blasting of surfaces coated with lead containing pigments (for example red-led paint Pb_3O_4, lead white or lead chromate) or chromium (VI) containing pigments (for example lead chromate).Waste blasting materials from blasting of boats or ships which have been coated with toxic or ecotoxic anti-fouling paints. The possible contents of heavy metals in the unused blasting material shall be accounted for in the overall assessment [12 01 16*].
9. Corrosive liquids which have pH <2 or pH >11,5 [many waste codes may be covered].
10. Contaminated packaging which contains or has contained chemicals which are classified so as to be labelled with the danger symbol skull and crossbones (“Very toxic T+”, “Toxic T”), or the danger symbol “Corrosive” in combination with the risk phrase R35 (very corrosive) or the danger symbol “Dangerous for the environment” (dead fish, “Ecotoxic N”). In addition, contaminated packaging which is labelled with the risk phrases R 52-53 alternatively R 52/53 (Harmful for aquatic organisms, may cause adverse long term effects in the aquatic environment) should be included [for example 15 01 10*].
11: Isolating window panes, sealed with glue [i.e. sealed glazing units], produced from 1956 until 1973 and fluorescent-lamp fittings with phase compensating capacitor(s) from the same time period, if it can not be proved that the capacitor is PCB-free [17 09 02*].
12. Elastic sealants for construction joints and slip-preventing floorings from buildings / constructions completed or refurbished in the time period 1956 – 1973 and where it cannot by chemical analysis be proved that these are PCB-free [17 09 02*].

b) In another approach mirror entries where experience shows that either the hazardous mirror entry or the non-hazardous mirror entry is not used are shifted to the appropriate absolute list. Also in this approach opting out is possible when it is proven by analysis that the waste does not show hazardous characteristics.

Discussion with stakeholders and at an expert workshop showed that acceptance of a third type of entries is limited since it reduces usability of the LoW. The alternative approach b) is more user-friendly and provides the same reduction of waste characterisation efforts as approach a).

In order to appraise the magnitude of the applicability of such an approach on European level a detailed analysis of the distribution of waste amounts in the mirror entries has been performed. Data have been made available in time by 10 Member States[40].

Different distribution patterns can be observed. Example 1 below shows a pattern where the majority of waste amounts is assigned to the hazardous mirror entry, but where the portion of non-hazardous waste amounts ranges from <10% to 50%. Potential reasons are, inter alia, use of different types of products in the countries.

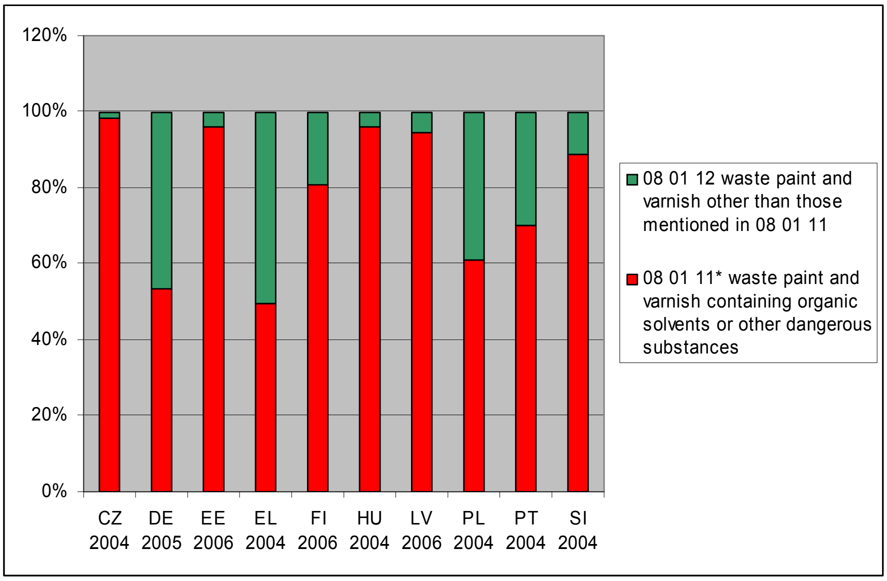

Figure 7: Distribution of waste amounts in mirror entries – example 1

[40] Member State/Year of data: CZ 2004, DE 2005, EE 2006, EL 2004, FI 2006, HU 2004, LV 2006, PL 2004, PT 2004, SI 2004

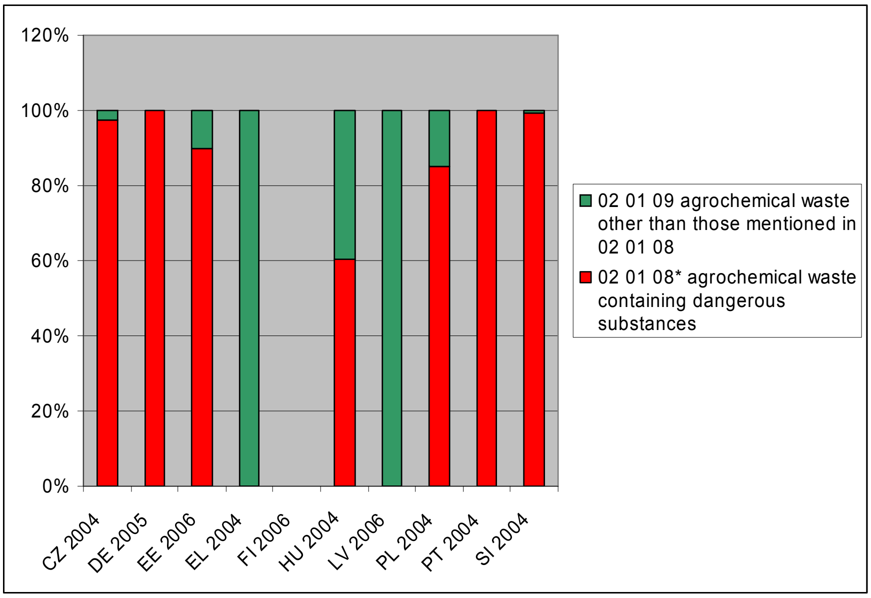

Figure 8: Distribution of waste amounts in mirror entries – example 2

In another pattern the differences in the assignment of waste between the Member States are very high. This is the case for example for 10 13 10 / 10 13 09* and 02 01 09 / 02 01 08* (see figures below). Reasons could be differences in production, production processes and applied materials.

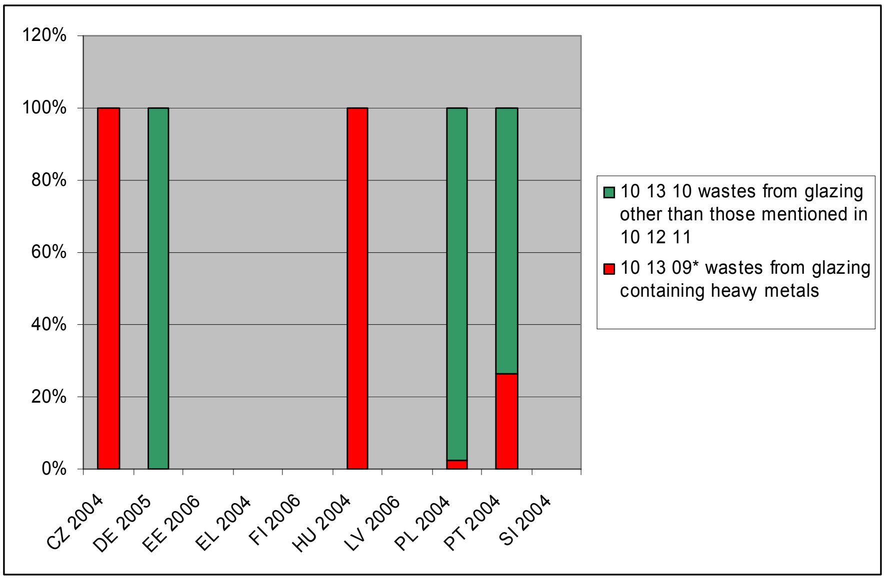

Figure 9: Distribution of waste amounts in mirror entries – example 1

In some cases one can assume that the figures might be influenced additionally by differences in the classification practice.

The table below summarises mirror entries where the average portion of hazardous waste amounts in the pair of mirror entries is >70% and the maximum of non-hazardous waste amounts in the mirror pairs <30% which are the most significant candidates to be "shifted" to absolute entries.

Table 27: Candidate list of mirror entries to become absolute entries by removal of non-hazardous mirror entries (short list)

LoW Code	Max	Min		Average
10 03 21*	**100%**	**86%**	•	**92%**
10 03 22	**14%**	**0%**	•	**8%**
10 03 23*	**100%**	**98%**		**100%**
10 03 24	**2%**	**0%**	•	**0%**
10 03 25*	**100%**	**100%**		**100%**
10 03 26	**0%**	**0%**	•	**0%**
10 03 27*	**100%**	**100%**		**100%**
10 03 28	**0%**	**0%**	•	**0%**
10 09 15*	**100%**	**100%**		**100%**
10 09 16	**0%**	**0%**	•	**0%**
10 10 13*	**100%**	**90%**	•	**98%**
10 10 14	**10%**	**0%**	•	**2%**
10 10 15*	**100%**	**100%**		**100%**
10 10 16	**0%**	**0%**	•	**0%**
11 01 11*	**100%**	**73%**	•	**92%**
11 01 12	**27%**	**0%**	•	**8%**
19 13 03*	**100%**	**100%**		**100%**
19 13 04	**0%**	**0%**	•	**0%**

Furthermore the analysis showed that additional entries can be candidates to be shifted from mirror entries to absolute entries (see the complete list of candidates in vol. 4 Annex 26). However, an extended and improved data basis is necessary to decide about those candidates since the results are less significant. Concluding from an expert workshop held in November 2008 it is proposed to use this list as a starting point for a share point activity of Member States experts where the individual workload is reduced in a way that each participating Member States elaborates on selected mirror entries.

The impact of this measure will be reduced administrative (and potentially financial) efforts for the characterisation of waste of the affected entries. No waste will newly become hazardous waste because it is possible for the waste producer to opt out. Thus no additional costs result from this measure. No positive or negative impact is expected regarding environmental aspects.

Summary

It is proposed to delete the following entries of the LoW: 10 03 22, 10 03 24, 10 03 26, 10 03 28, 10 09 16, 10 10 14, 10 10 16, 11 01 12, 19 13 04. As a consequence the corresponding hazardous mirror entries become absolute entries.

The possibility for the waste producer to opt out (by providing evidence that his specific waste is non-hazardous) should be included as an explicit provision in the revised LoW.

6.2.6.2 Specific classification problems

The following section addresses specific classification problems that have been raised by stakeholders in two questionnaire surveys (see volume 1 of this report).

6.2.6.2.1 Inorganic compounds

One of the most frequently stressed issue with the classification of waste as hazardous or non-hazardous is the classification of waste that contains metals and their compounds.

It has been described as problematic on different levels:

- In many cases metal compounds are classified in chemicals legislation, in fewer cases elemental metals
- High efforts are necessary to identify which compound of a metal is present in a waste of unknown composition.
- The analysis on metal compounds is often very costly.

A stakeholder provided an approach where in cases of waste with unknown composition the content of elemental metals can be taken as a basis for classification:

The provided table (see below) mentions a number of substances (**column 1 and 2**) and their classification according to the DSD (**column 3**). **Column 4** describes the corresponding H-criterion of the HWD and **column 5** the related generic concentration limit.

Column 7 refers note 1 of Annex 7 of the DSD which clarifies that the concentrations indicated shall be understood to mean % by weight of the metal, relative to the total weight of the preparation.

“If the metal compounds in the waste are known, the element content can be used to calculate the concentration of the metal compound (e.g. oxides and sulphates in ashes and slags).
Column 8 contains the factors for converting element contents to compound contents.

In cases where it is not possible to draw conclusions as to the metal compounds contained in the waste, the hazards of the waste can be estimated using the element content. For this purpose, an element limit value is derived from the various compound limit values. The concentration limits for elements are given in **column 6** "generalised limit value". For each hazardous property, the respective lowest concentration limit for compounds is generally selected." [BMU 2001]

Table 28: Identification of concentration limits for metals and metal compounds (exemplary excerpt) [BMU 2001]

Element	Substance name	Classification of the substance	HWD H-criterion	Generic concentration limit of the LoW in %	Generalised limit value in %	Note 1 of DSD	Element/ Substance content factor
As	Arsenic	T; R23/25	H6	3	**0.1**		1
	Arsenic acid and salts thereof	N; R50-53	H14	0.25	0.25		1.89
		T; R23/25	H6	3	**0.1**		1.89
		Carc.Cat.1; R45	H7	0.1	0.1		1.89
	Arsenic compounds other than those expressly listed in this Annex	N; R50-53	H14	0.25	0.25	x	
		T; R23/25	H6	3	**0.1**	x	
	Lead hydrogen arsenate	N; R50-53	H14	0.25	0.25	x	
		T; R23/25	H6	3	**0.1**	x	
		Carc.Cat.1; R45	H7	0.1	0.1	x	
	Diarsenic pentoxide	N; R50-53	H14	0.25	0.25		1.53
		T; R23/25	H6	3	**0.1**		1.53
		Carc.Cat.1; R45	H7	0.1	0.1		1.53
	Diarsenic trioxide	N; R50-53	H14	0.25	0.25		1.32
		T+; R28	H6	0.1	0.1		1.32
		Carc.Cat.1; R45	H7	0.1	0.1		1.32
		C; R34	H8	5	5		1.32
Cd	Cadmium compounds except…	N; R50-53	H14	0.25	0.25	x	
		Xn; R20/21/22	H5	25	25	x	
	Cadmium chloride	N; R50-53	H14	0.25	0.25		1.63
		T+; R26	H6	0.1	0.1		1.63
		Carc.Cat.2; R45	H7	0.1	0.1		1.63
		Muta.Cat.2; R46	H11	0.1	0.1		1.63
	Cadmium cyanide	N; R50-53	H14	0.25	0.25		1.46
		T+; R26/27/28	H6	0.1	0.1		1.46
		Xn; R68	H11	1	**0.1**		1.46
	Cadmium oxide	T;R48/23/25	H6	3	**0.1**		1.14
		Carc.Cat.2; R49	H7	0.1	0.1		1.14
	Cadmium sulphate	N; R50-53	H14	0.25	0.25		1.85
		Xn;R22	H5	25	25		1.85
		T; R48/23/25	H6	3	**0.1**		1.85
		Carc.Cat.2; R49	H7	0.1	0.1		1.85
	Cadmium sulphide	R53	H14	25	25	x	
		Xn; R22	H5	25	25	x	
		T; R48/23/25	H6	3	**0.1**	x	
		Carc.Cat.3; R40	H7	1	**0.1**	x	
		Xi; R36/38	H4	20	20		2.51
		Xn; R22	H5	25	25		2.51
Hg	Mercury	N; R50-53	H14	0.25	0.25		1
		T; 23	H6	3	**0.1**		1
	Inorganic mercury compounds other than mercury(II) sulphide and those expressly listed in this Annex	N; R50-53	H14	0.25	0.25	x	
		T+; R26/27/28	H6	0.1	0.1	x	
	Organic mercury compounds	N; R50-53	H14	0.25	0.25	x	

Ele-ment	Substance name	Classification of the substance	HWD H-criterion	Generic con-centration limit of the LoW in %	Generalised limit value in %	Note 1 of DSD	Element/ Substance content factor
	other than those expressly listed in this Annex	T+; R26/27/28	H6	0.1	0.1	x	
	Mercurous chloride	N; R50-53	H14	0.25	0.25		1.18
		Xi; R36/37/38	H4	20	20		1.18
		Xn; R22	H5	25	25		1.18
	Mercury dichloride	N; R50-53	H14	0.25	0.25		1.35
		T+; R28	H6	0.1	0.1		1.35
		C; R34	H8	5	5		1.35

Such an approach implies a huge potential to reduce efforts for the classification of waste. In cases where the waste is characterised anyhow without knowledge about the concrete compounds and their concentrations the approach implies the potential for a harmonisation and probably also for more appropriate risk management from more correct classification.

The conclusion from process characteristics to the quantifiable presence of metal compounds includes a number of settings not least about a number of parameters which influence the waste composition.

The scientific basis to assess whether the settings taken as basis for the list described above can be generalised or transferred to other countries and their production processes seems to be weak. Research results about differences in the composition of wastes between the Member States are not available (e.g. whether a waste contains other metal compound patterns in Member State A than in Member State B).

Concluding it is to be stated that no sufficient scientific basis is available yet to justify specific factors in such an approach on European level. The potential for a reduction of analytic efforts and the need to reach a harmonisation of widely varying approaches in practice in the Member States (see volume 1 of this report) advices to initiate further research. As a first step discussion about possible factors agreed as convention between experts is advised in order to avoid too long delay and to cope with the great importance of such an approach.

6.2.6.2.2 Organic compounds

A similar situation as for inorganic compounds has been mentioned by stakeholders for the characterisation of waste that contains multiple and/or hard to analyse organic compounds. Major emphasis was given to the characterisation of tar containing waste. This issue is discussed in detail in chapter 6.2.6.2.3 of this report.

In addition difficulties with the uniform determination hydrocarbons concentrations in wastes has been raised as an issue. Hydrocarbons cover complex mixtures of various chemical compounds and their composition may also vary significantly according to the basic ingredient and the refining process. Using different analytical techniques, e.g. infra-red spectrophotometry and gas chromatography separation together with a mass spectrometer as well as different extraction methods, may lead to different classification results.

In order to harmonise approach on European level it is proposed to base analysis of hydrocarbon content on EN 14039 “Characterization of waste. Determination of hydrocarbon content in the range of C10 to C40 by gas chromatography” mandatory. Reference to this standard shall be made in a European Document on characterisation, analysis and testing of waste.

6.2.6.2.3 Tar containing waste

Coal tar is a complex mixture of hydrocarbon compounds that results from distillation of coal in coke ovens.

Construction materials containing tar are to be classified as hazardous if they contain more than 1000 mg/kg tar (CLP Carc. Cat.1). Because the analysis of tar is expensive and difficult other approaches are taken in practice:

- One possibility is to base the classification of a tar containing waste on the content of PAH. For this, based on experience and conventions, it is agreed that a certain portion of the tar occurs as PAH. An example is that 20% of the tar occurs as 16PAH. Concluding a waste is hazardous when the PAH concentration is above 200 mg/kg.
- In another approach Benzo(a)pyrene is taken as a basis. The convention about the occurrence of Benzo(a)pyrene is for example that 5% of the tar equals Benzo(a)pyrene. Construction materials are then hazardous wastes when the Benzo(a)pyrene concentration is above 50 mg/kg.

Input from stakeholders revealed that the conventions taken as bases for those approaches are questioned. Generalisation from regional experience is often not seen as appropriate. A weak scientific basis complicates the discussion.

Stakeholder suggested a limit value that has been developed based on conclusion by analogy. According to this approach a B(a)P concentration of 3 ppm indicates a tar content of 0.1% which is the generic concentration limit for mixtures of hydrocarbons that fulfil criterion H7. The related content of PAH (16 EPA) was here 150 – 300 ppm.

A technical analysis of the production processes of tar containing road construction material and related calculations resulted in a concentration limit of 400 mg PAH (16EPA) per kg.

The total amount of tar containing materials in road construction is estimated to be >300 million tonnes. However, no data is available describing amounts per concentration level of the respective indicative substances (PAH, Benzo(a)pyrene).

Concluding it can be stated that no sufficient scientific basis is available to set limit values based on scientific ground on European level. Support for the finding of a convention on European level in form of quantified impacts (amount of affected waste depending on the limit value) should be developed based on comparable analytical results from different Member States. If the research reveals that significant variations in the composition of the wastes occur it is proposed to take no action on European level but on national level where necessary.

6.2.6.2.4 Definition of "sludge" vs. "liquid waste"

A comment refers to the general lack of a definition for the terms sludges and liquid wastes. In some sections (e.g. 08 01, 08 04) the LoW provides different codes for solid, sludgy and liquid wastes and suspensions without providing clear criteria for distinction.

Numerous generic definitions of the terms are available. However, definitions are required in the context of waste management activities.

Most often the distinction between "liquid", "sludge" and "solid" is problematic in practice for waste to be landfilled. In most other cases existing transport requirements (national, international) or acceptance criteria of the waste treatment plant provide appropriate definitions for daily practice of waste management.

The Landfill Directive provides the definition "any waste in liquid form, including waste waters but excluding sludge" [COUNCIL DIRECTIVE 1999/31/EC of 26 April 1999 on the landfill of waste, Art. 2.q].

A more practical definition for waste to be landfilled has been provided by a stakeholder saying:

"(a) Any waste that near instantaneously flows into a hollow made in the surface of the waste

(b) any waste load containing a free-draining liquid substance that is more than 250 litres or 10% of the load volume, whichever is smaller. The term free draining means a liquid as defined in (a), irrespective of whether that liquid is in a container.

Use the first interpretation, (a), to distinguish between liquids and sludges. It is most relevant for fine-grained, homogeneous wastes such as filter-cakes, sewage sludge and road-gully silts. A waste that flows only slowly, rather than near instantaneously, into a hollow will be a sludge or a fine-grained solid – it is therefore not prohibited.

Use the second interpretation, (b), if you know that there are small amounts of liquid in a generally solid waste. This could be cartons of milk or juice in mixed commercial waste. Also use it if liquids have been accidentally added to the waste. This would include liquid that has drained or been squeezed from components of the waste, and rainwater that has fallen into the waste container." [Deed, Christopher pers.com. July 2008].

Given the broad variety of application fields and the need to provide concrete and adapted definitions in order to actually provide practical support it is proposed to solve the issue of missing definitions for the terms "solid", "sludge", "liquid" and "suspensions" in the context of the concrete waste management activity. Including all potentially relevant definitions in a revised LoW or a guidance document would render these documents voluminous and with limited usability.

6.2.6.2.5 Batteries

The LoW comprises the following entries for batteries:

16 Wastes not otherwise specified in the list
16 06 Batteries and accumulators
16 06 01* lead batteries
16 06 02* Ni-Cd batteries
16 06 03* mercury-containing batteries
16 06 04 alkaline batteries (except 16 06 03)
16 06 05 other batteries and accumulators

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 33* batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries
20 01 34 batteries and accumulators other than those mentioned in 20 01 33

In addition the LoW comprises the following entry for fractions of batteries:

16 06 06 separately collected electrolyte from batteries and accumulators*

Batteries that are labelled as either "lead batteries" or "Ni-Cd batteries" and batteries containing mercury are classified as hazardous as well as separately collected electrolyte from batteries and accumulators (without differentiation regarding the type of electrolyte). For all other batteries and accumulators only a non-hazardous entry is available in section 16 01 (16 06 05)[41] . This entry is the only one in section 16 06 of the LoW that can cover a wide range of battery types that can not be assigned to entries 16 06 01 to 16 06 03. Some of those battery types are described in more detail below.

[41] For entry 20 01 33 the hazardous property of the waste results also from the battery types lead batteries, NiCd batteries and mercury containing batteries ("batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries").

- NiMH cells contain substances which fulfil the criterion H7 (Nickel Carc. Cat. 3; R40 R43) in concentrations above 1%.
- Ni-Fe cells also contain substances which fulfil criterion H7 (nickel dihydroxide, Carc. Cat. 3; R40, Xn; R20/22, R43, N; R50-53) in concentrations above 1%.
- In alkaline cells the content of substances classified as Xn; R22, C; R35 can be above the respective concentration limits that render waste batteries hazardous[42] if they are not discharged. For non-discharged batteries no appropriate entry is available[43].
- Discharged Zinc-Carbon batteries can contain Zinc chloride in concentrations below or above the threshold for the criterion H8 (C R34).
- Li-thionylchloride cells contain substances, inter alia, classified as C R35 in concentrations above the limit value that render waste batteries hazardous (Annex I DSD: R14, Xn; R20/22, R29, C; R35).

In order to assign also other hazardous waste batteries than lead, NiCd and mercury containing cells to an appropriate entry an option would be to mark entry 16 06 05 "other batteries and accumulators" as hazardous. In this case also non-hazardous waste batteries must be assigned to a hazardous waste entry. Taking into account the market shares of different battery types[44] this does not seem to be justified.

A second option is the further differentiation of the entries in section 16 06. Taking into account the market shares of battery types an individual entry for each type would lead to an extended list of entries where the new entries cover only small amounts of wastes. Those further differentiated entries would not lead to other risk management measures than an entry that covers different types of hazardous waste batteries. A common new entry for hazardous waste batteries other than those mentioned 16 06 01, 16 06 02 and 16 06 03 can cover e.g. batteries with hazardous properties containing Ni or Li or relevant portions of KOH (including non-discharged batteries). An additional specific entry for unsorted batteries should be marked as hazardous waste because it might contain hazardous waste batteries. The existing entry 16 06 04 can be amended to "discharged alkaline and zinc carbon cells (except 16 06 03)".

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[42] Annex 1 of the DSD specifies for potassium hydroxide:

[42] Annex 1 of the DSD specifies for potassium hydroxide:

potassium hydroxide; Xn; R22, C; R35	C ≥ 25 %: C; R22-35 5 % ≤ C < 25 %: C; R35 2 % ≤ C < 5 %: C; R34 0,5 % ≤ C < 2 %: Xi; R36/38

[43] This applies also for a number of other non-discharged battery types.

[44] See also the extended impact assessment: COMMISSION STAFF WORKING PAPER DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON BATTERIES AND ACCUMULATORS AND SPENT BATTERIES AND ACCUMULATORS COM(2003)723 final

Concluding it is proposed to amend the section 16 06 of the LoW as follows:

16 Wastes not otherwise specified in the list
16 06 Batteries and accumulators

16 06 01*	lead batteries
16 06 02*	Ni-Cd batteries
16 06 03*	mercury-containing batteries
16 06 04	discharged alkaline and zinc carbon cells (except 16 06 03 and 16 06 05)
16 06 05*	batteries and accumulators other than those mentioned 16 06 01, 16 06 02 and 16 06 03 containing hazardous substances
16 06 06*	separately collected electrolyte from batteries and accumulators
16 06 07*	mixed batteries and accumulators
16 06 08*	Ni-Mh-batteries
16 06 09*	Lithium batteries

Entries 09 01 10 (single-use cameras without batteries), 09 01 11* (single-use cameras containing batteries included in 16 06 01, 16 06 02 or 16 06 03) and 09 01 12 (single-use cameras containing batteries other than those mentioned in 09 01 11) are subject to be deleted because they can be included in other entries (see section about new and deleted entries in volume three of this report).

6.2.6.2.6 WEEE

The classification of waste electrical and electronic equipment has been raised as problematic due to missing differentiation of the entries of the LoW and the specific problem of hazardous components in the appliances. This issue is dealt with in the chapter about missing entries in volume 3 of this report.

6.2.6.2.7 SLF – variability of waste composition

Shredder light fraction (SLF) is one of the output materials from shredding of complex goods like for example end of live vehicles, waste electrical and electronic equipment and industrial appliances. The LoW has mirror entries for shredder light fraction in section 19 10 of the list ("wastes from shredding of metal-containing wastes"):

19 10 03* fluff-light fraction and dust containing dangerous substances

19 10 04 fluff-light fraction and dust other than those mentioned in 19 10 03

The composition of SLF is determined by the composition of the input materials. Depending whether for example the depollution requirements of the ELV Directive and the WEEE Directive are fulfilled the content of hazardous substances (e.g. PCB, mercury, hydrocarbons) can vary in a wide range. In addition the composition varies over the time (e.g. as a result of PCB use ban, the introduction of new legal acts like ELV Directive or availability of input materials in the region of the shredder plant).

Stakeholders raised the point that common approaches are missing, which ensure a European wide harmonised determination of variability of waste composition and how to handle variability in the context of the LoW and the characterisation of waste. It was stressed that this is also an issue for many other heterogeneous waste types. This issue has also relevance in the context of generic characterisation strategy for the classification of waste (step 1.2; see vol. 2 chapter 6.2.6.3 of this report).

Most of the cases raised by stakeholders are linked with specific disposal paths like landfilling and (co-)incineration of waste. But since the characterisation in the context of the LoW has to be done independently from disposal path a more general approach is required.

Article 6.4 of the DPD requires that a new evaluation of health hazard shall be performed whenever

- changes of composition of the initial concentration, as a weight/weight or volume/volume percentage, of one or more of the dangerous constituents are introduced by the manufacturer, in accordance with the following table:

Table 29: Change of composition and new evaluation of preparations according to Art. 6.4 of the DPD

Initial concentration range of the constituent	Permitted variation in initial concentration of the constituent
≤ 2,5 %	± 30 %
> 2,5 ≤ 10 %	± 20 %
>10 ≤ 25 %	± 10 %
>25 ≤ 100 %	± 5 %

- changes of composition involving the substitution or addition of one or more constituents, which may or may not be dangerous within the meaning of the definitions set out in Article 2, are introduced by the manufacturer.

This approach could be transposed on waste characterisation where constituents of the waste are known. For the majority of cases characterisation of waste is done without detailed analysis of the constituents (see chapter 6.2.6.3 on generic characterisation strategy) which limits applicability of the DPD approach.

In the context of the implementation of the Landfill Directive 1999/31/EC and the Landfill Decision 2003/33/EC variability of waste compositions must be determined in the course of the basic characterisation (paragraph) and the compliance checks. New characterisation can be dismissed for wastes which are regularly generated under the condition that source and processes of waste generation don't change and respective documentation is provided. However, since waste generating processes and related circumstances differ widely no detailed rules are provided in the European Landfill legislation to determine "sameness" of wastes.

Standards and technical reports on/for the characterisation of waste and handling of variability of waste composition have been developed inter alia by the Technical Committee CEN/TC 292 "Characterization of waste", in order to standardise approaches:

- EN 14899, Characterization of waste - Sampling of waste materials - Framework for the preparation and application of a Sampling Plan.
- CEN/TR 15310-1, Characterization of waste – Sampling of waste materials - Part 1: Guidance on selection and application of criteria for sampling under various conditions.
- CEN/TR 15310 -2, Characterization of waste – Sampling of waste materials - Part 2 - Guidance on sampling techniques.
- CEN/TR 15310 -3, Characterization of waste – Sampling of waste materials – Part 3: Guidance on procedures for sub-sampling in the field.
- CEN/TR 15310 -4, Characterization of waste – Sampling of waste materials – Part 4: Guidance on procedures for sample packaging, storage, preservation, transport and delivery.
- CEN/TR 15310 -5, Characterization of waste – Sampling of waste materials – Part 5: Guidance on the process of defining the Sampling Plan.

In spite of the detailed technical reports national approaches still differ significantly[45] or are even not fully operational in some Member States. Anyhow no adaptation to the more general needs of the LoW on European level is available at present.

Further work is necessary to develop a comprehensive basis for handling of variability of waste composition and the classification of waste that can be used in a European Guidance Document on the characterisation of waste and the assignment to entries of the LoW.

6.2.6.2.8 PCDD/F

The classification of waste contaminated with PCDD/F has been stressed by stakeholders as an issue due to the missing specific limit value in chemicals legislation.

This has been taken up in chapter 6.2.5.2 of this report.

6.2.6.2.9 Classification of waste based on leachate composition

Stakeholders raised the issue of classification of waste that releases contaminated leachate. This issue is discussed in chapter 6.2.2.3 of this report.

[45] See also: Comparison program for landfill inspection and monitoring, IMPEL, http://landfill.oekopol.de

6.2.6.3 Generic characterisation approach

The overall approach for the characterisation of waste aims at achieving a reliable characterisation of waste as hazardous or non-hazardous by minimising at the same time the analytical efforts as far as possible without declining the environmental protection level.

The approach proposed on the following pages takes up the results as presented in section 6.2.6 above.

Step 1: Absolute entries

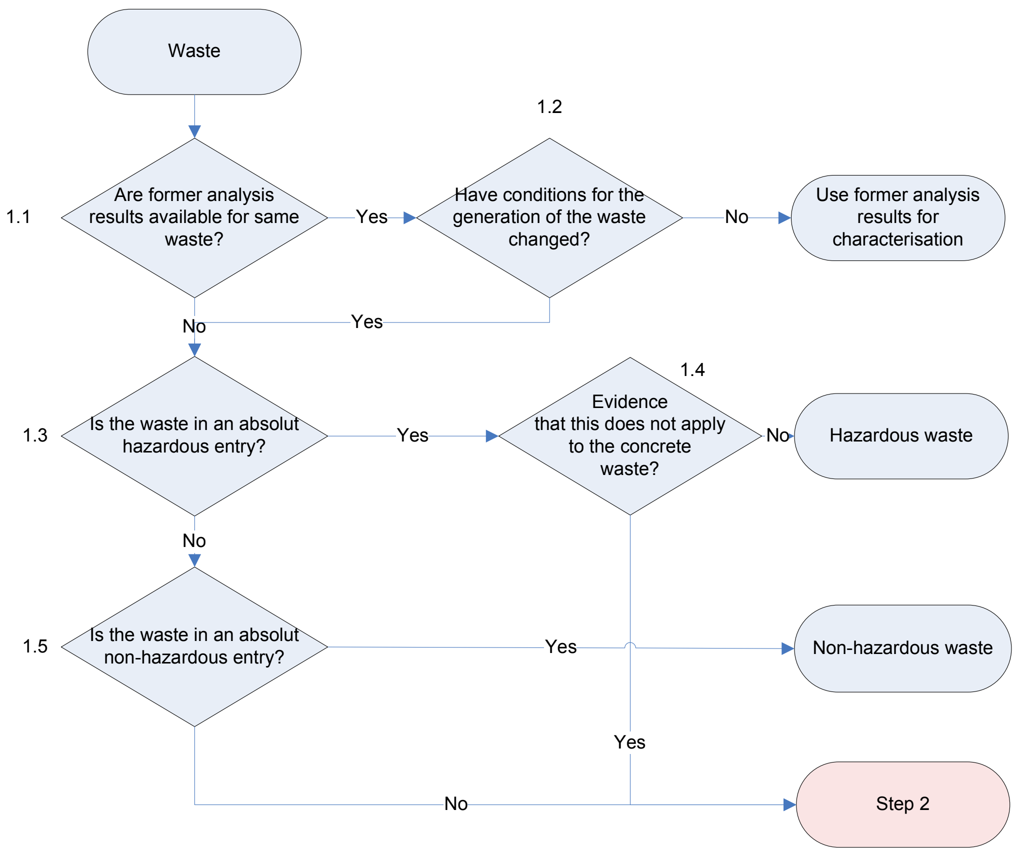

Figure 10: Generic characterisation strategy - step 1

Step 1.1 and 1.2: In order to ensure the reliability of the characterisation and to support answering question 1.2 further guidance is seen as necessary. The question about ranges of compositions and variability of waste compositions is discussed in chapter 6.2.6.2.7 of this report.

Step 1.4: This step is based especially on the considerations in chapter 6.2.6.1 and the provision of a revised LoW that it is possible for an owner of a waste in an absolute hazardous entry to opt out by providing evidence that his specific waste is non-hazardous.

Step 2: Existing knowledge

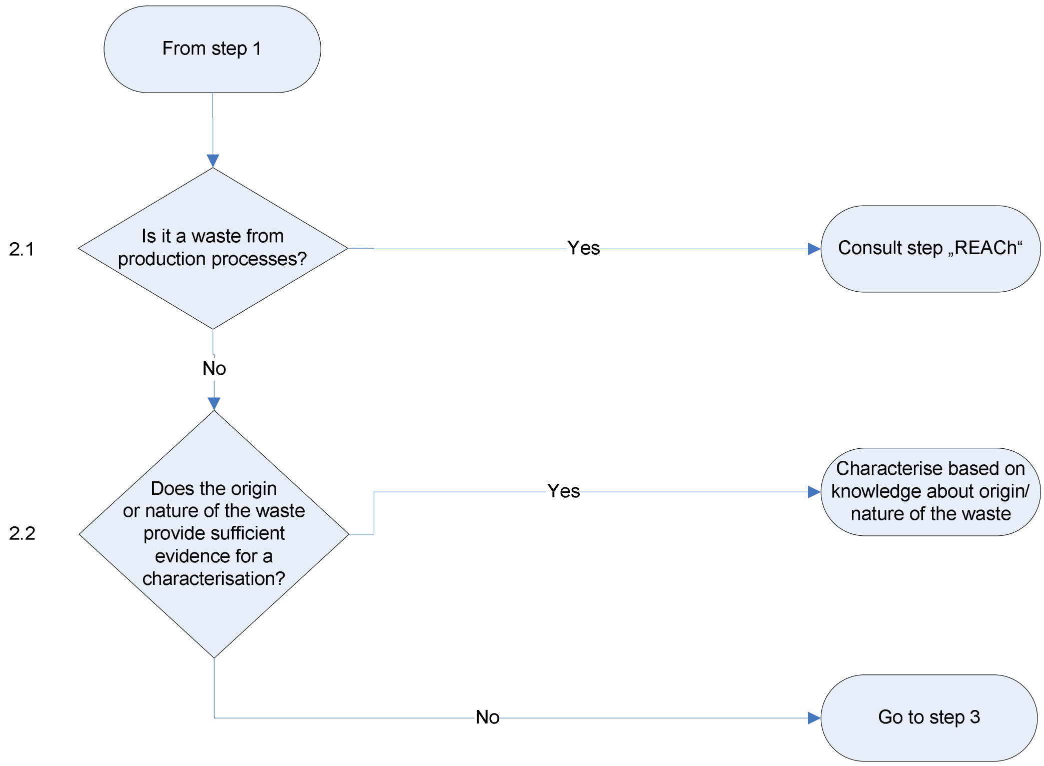

Figure 11: Generic characterisation strategy - step 2

Step 2.1: See the chapter on REACH in volume 2 of this report for explanation of this step.

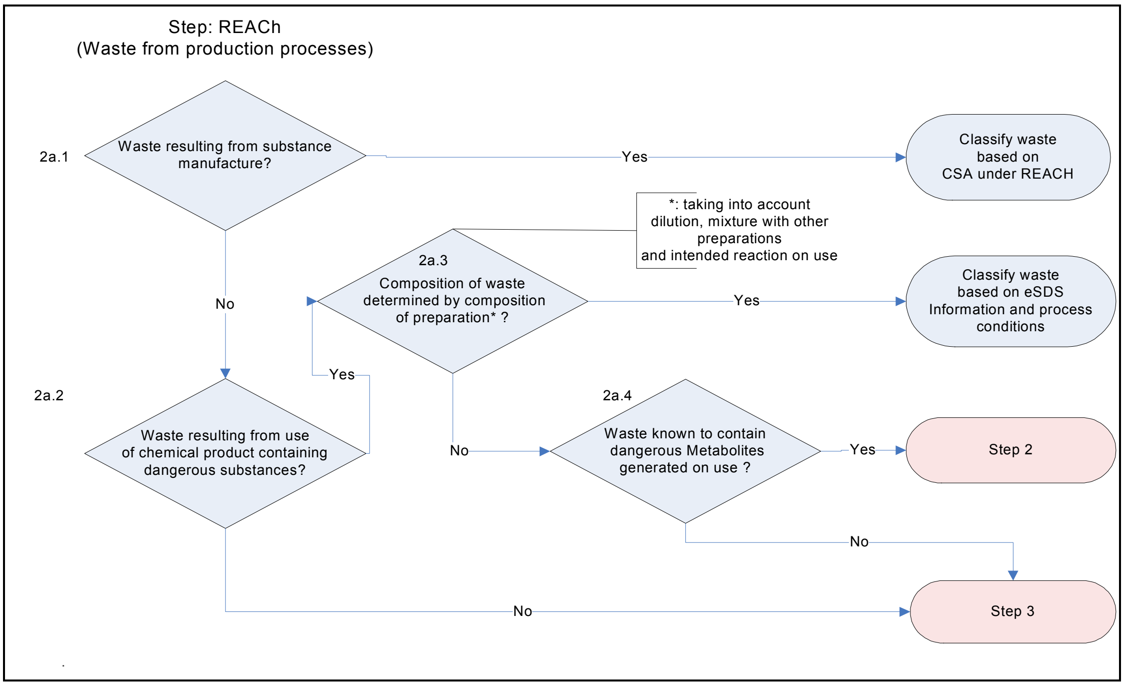

Figure 12: Generic characterisation strategy - step REACH

See chapter on REACH in volume 2 of this report for explanation of the steps shown in this figure.

Step 3: H-Criteria and bio-testing

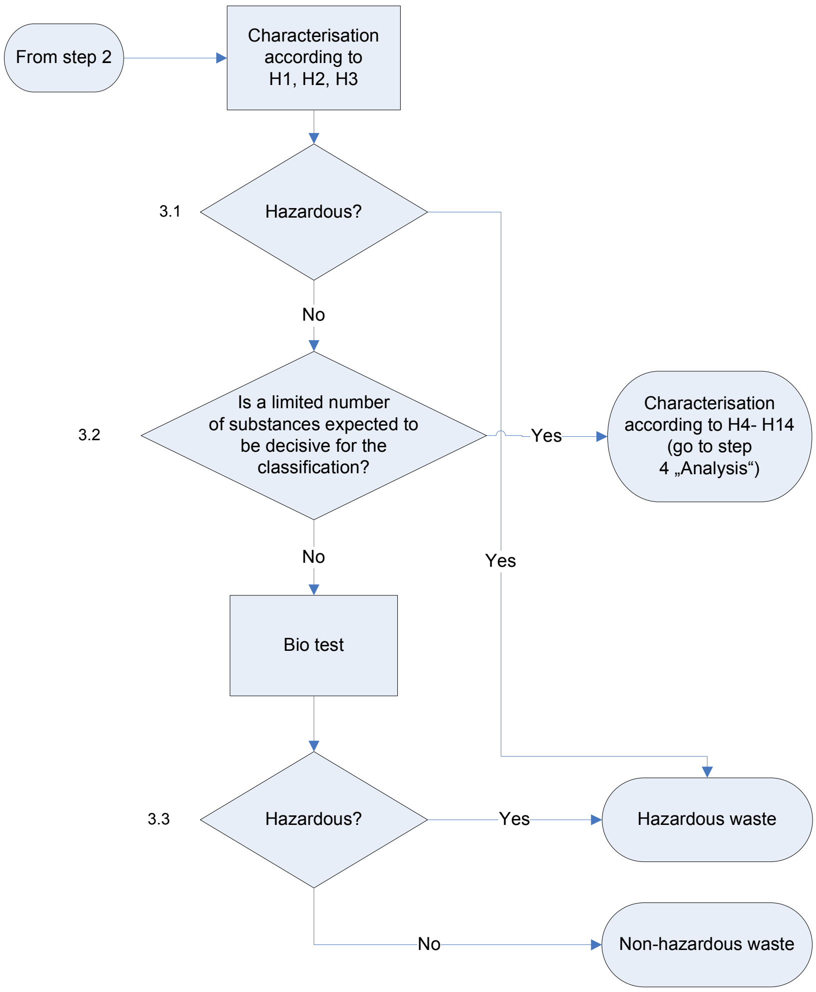

Figure 13: Generic characterisation strategy - step 3

Step 3.2 takes up the problem that it is very costly to characterise a waste with a broad range of unknown components by laboratory analysis. Laboratory analysis is best to be applied when a narrow range of substances are relevant for characterisation of the waste (where possible by simplified analysis methods as shown in step 4 overleaf).

Step 4: Simplified analysis

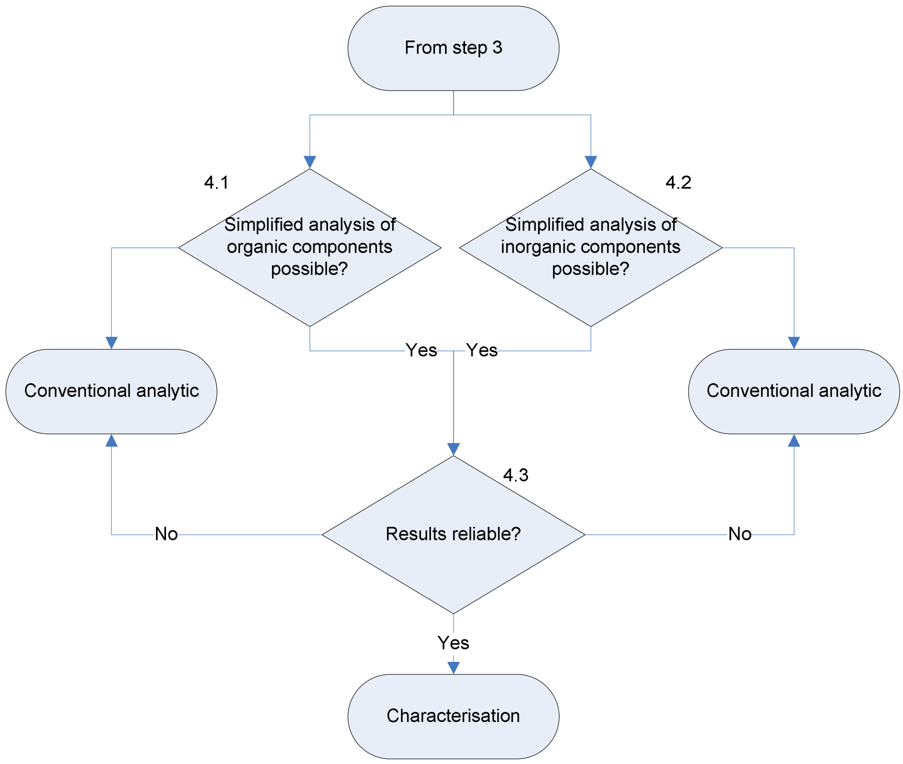

Figure 14: Generic characterisation strategy - step 4

Step 4.1 and 4.2: For explanations of the simplified analysis see chapter 6.2.6.2.1 and 6.2.6.2.3 of this report

Step: Application of concentration limits

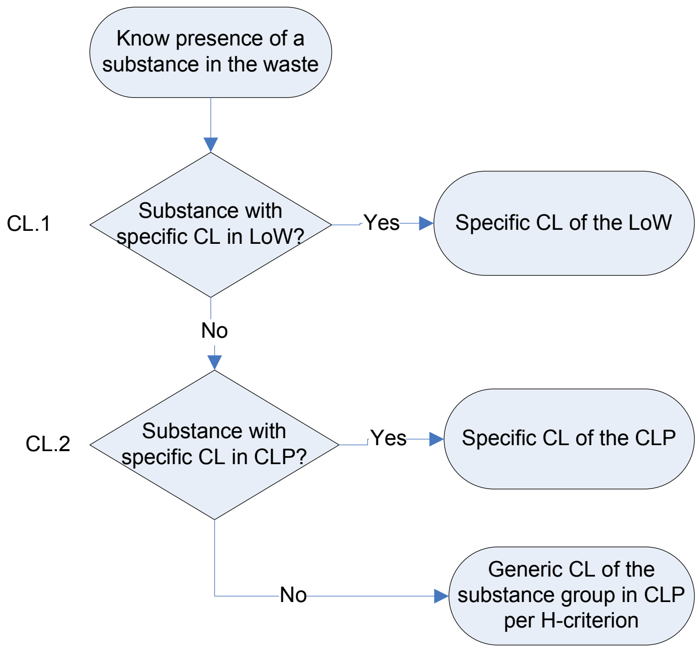

Figure 15: Generic characterisation strategy - step "Concentration Limits"

Step CL.1: At this step it is checked whether the LoW provides concentration limit values that are specific for waste management purposes and that are not considered sufficiently in the CLP regulation (e.g. for PCDD/F) (see chapter 6.2.5).

Step CL.2: In line with the provisions of the chemicals legislation it is to be checked at this step whether the CLP Regulation provides specific concentration limits for the substance (see chapter 6.2.4).

If neither step CL.1 nor CL.2 delivers specific values then the generic concentration values of the LoW are applied (see chapter 6.2.3 of this report).

The decision trees should be used in order to ensure harmonisation of the characterisation approaches in the Member States and improved legal certainty for waste producers. They are especially addressed to Member States that do not provide comparable support in the classification procedure to waste producers.

It is proposed to include the generic characterisation strategy as described above in an Annex of the revised LoW in order to ensure harmonised characterisation process.

Regarding the impact of the generic characterisation strategy see the chapters on the individual steps and measures.

Context of laboratory analysis of waste

In the overall characterisation strategy the laboratory analysis of waste is only necessary when all other steps do not lead to a classification of the waste (see generic characterisation strategy in vol. 2 chapter 6.2.6.3 of this report).

No comprehensive information is available about how many wastes "reach" that characterisation step in practice. Expert judgements assume that the vast majority of waste classifications and assignments to LoW entries is done without laboratory analysis (see also the section about the frequency of laboratory analysis in volume 1 of this report).

For the remaining number of waste classifications a simplified approach has high economic relevance because of the difficult analysis of metal compounds and the related high costs of laboratory analysis. Because of the broad range of cases it is not possible to give sensible averages. Stakeholders reported individual cases where costs for simplified analysis is significantly below 100 € while the costs for full analysis of compounds is in the range of some thousand Euros.

It is unclear how often full analysis of metal compounds is actually done. Stakeholders reported at workshops performed in the course of this project that these are relatively rare cases often in the context of disputes between waste producers and authorities.

Harmonisation of the classification of waste on European level will be an important impact of the application of simplified classification approaches in Europe ensuring that a waste that is hazardous in Member State A is also hazardous in Member State B and vice versa.

A positive environmental impact can be expected when improved scientific and statistical basis are applied for simplified approaches from initiatives on European level.

6.2.6.4 Other steps to simplify characterisation of waste and limit the analytical efforts

Stakeholders proposed in an expert workshop in November 2008 to further limit the analytical efforts for the characterisation of waste by narrowing down the number of potentially relevant substances for the characterisation of waste: Presently several mirror entries include the term “containing dangerous substances”. However, often only a limited number of substances or even just one substance is relevant for the characterisation of waste. Analytical efforts for the characterisation of waste could be reduced when the waste is only analysed regarding the presence/concentration of that specific substance. Knowledge about those substances is available at several sources (including some national guidance documents). In some cases the term “containing dangerous substances” can be replaced by naming of the specific substance (as it is already the case in some mirror entries). In other cases a European Guidance Document (see volume 3 of this report) can describe a range of relevant substances.

Further detailing of this measure has not been possible due to time restrictions (deadline for finalisation of this report). The stakeholders proposed to do this work as a share point activity (each involved stakeholder works on a number of entries where he is most experienced).

6.2.7 Sub-scenario 2a

As described in chapter 1, 2and 6.2.3 the existing classification system based on the DSD and DPD differs partly from the system of the CLP regulation. In sub-scenario 2a the generic concentration limits as they are provided in Art. 2 in the current LoW are maintained as far as possible.

For it the list of generic concentration limits in the LoW as proposed in chapter 6.2.3 is amended as shown below.

Table 30: Generic concentration limits of scenario 2a (amended concentration limits are marked yellow)

H-criterion	Specification
H3 Flammable	flash point ≤ 55ºC,
H6 Toxic	substances classified as acute tox. Cat.1 or acute tox. Cat.2 or STOT single 1 (T+) at a concentration ≥ 0,1 %, substances classified as acute tox. Cat.3 or STOT single 1 (T) or STOT rep. Cat.1 at a concentration ≥3%,
H5 Harmful	substances classified as acute tox. Cat. 4 or STOT rep. 2 at a concentration ≥ 25 % (),
H8 Corrosive	substances classified as skin corr. Cat.1A at a concentration ≥ 1%, corrosive substances classified as skin corr. 1B at a concentration ≥ 5%,
H4 Irritant	substances classified as eye damaging cat.1 at a concentration ≥ 10%, substances classified as eye irrit. Cat. 2 or skin irrit. Cat.2 or STOT single Cat.3 at a concentration ≥ 20%,
H7 Carcinogenic	substances classified as carcinogenic cat. 1A or 1B at a concentration ≥ 0,1 %, substances classified as carcinogenic cat. 2 at a concentration ≥ 1 %,
H10 Reprotoxic	substances classified as reprotoxic cat. 1A or 1B at a concentration ≥ 0,5% substances classified as reprotoxic cat. 2 at a concentration ≥ 5%
H11 Mutagenic	substances classified as mutagenic cat. 1B at a concentration ≥ 0,1 %, substances classified as mutagenic cat. 2 or STOT single cat. 2 at a concentration ≥ 1 %,
H13 Sensitising	substances classified as Resp. sens. Cat.1 or Skin. sens Cat.1 at a concentration ≥ 1 %,

When effects of the introduction of the CLP Regulation shall be further minimised it would be necessary that comprehensive provisions must be shifted to waste legislation which are presently part of chemicals legislation (DSD and DPD). The analysis in [COM 2006] on pages 27 to 37 and 41 to 57 concretises necessary action. An extensive and voluminous waste legislation which sets up its own regime of R-phrases and classification procedures will be necessary.

The impact of maintaining the generic limit values of Art. 2 of the LoW as shown in the table above would be that potentially fewer wastes would be classified as hazardous waste than in scenario 2. Regarding the issue of quantitative relevance see chapter 7.2 of this report.

As a consequence of the limit values different to chemicals legislation products (mixtures, articles) will be classified hazardous at lower concentrations than wastes. E.g. if a material contains 0.4% of repro-toxic substances R60 or R61 it is "hazardous" as product but not hazardous as waste.

The objective of harmonisation of legislation (and with this the simplification of legislation) would not be achieved to the same extent as with scenario 3 or 2.

6.3 Scenario 3 – Direct link to CLP

Within this scenario wastes are regarded as mixtures in the sense of the CLP Regulation and are classified in the same way as mixtures.

The H-criteria in Annex III of the revised WFD are deleted. The text of the revised WFD includes for example the following provision: “A waste is classified as ‘hazardous’, if it fulfils the criteria for substances or mixtures of being ‘hazardous’ according to the CLP Regulation. Specific rules exist for infectious waste, waste which releases toxic or very toxic gases in contact with water, air or an acid and waste capable of yielding a substance, e.g. a leachate, which possesses any of the characteristics that render a substance or a mixture hazardous. Specific rules also apply for POPs”.

The generic concentration limits of CLP apply.

The specific limit values of CLP have to be considered for the classification of waste.

Waste-specific concentration limits are developed for POP wastes (similar to section 0 above). Regarding the H-criteria H9, H12 and H15 specific provisions are taken up in the LoW (as it is the case in scenario 2; see chapter 6.2.2 of this report) that cover the definitions of Annex III of the revised WFD and the further provisions of the LoW.

Regarding testing of waste no additional reference is required.

7 Analysis of impacts

7.1 Impacts of new / amended hazard classes and hazard categories

As described in chapter 6 of this report the hazard classes and hazard categories of the CLP Regulation do not fit 1:1 with the R-phrases of the DSD which are applied until now for the characterisation of waste. Different rules apply for the classification of mixtures for some of the end-points, in particular for classifying human health hazards (affected H-criteria H5, H6).

For quantifying the impacts it would be necessary to know which amount of waste has been characterised on the basis of which R-phrase.

The following section aims at an approximation of affected waste amounts at least based on H-criteria. An approach to appraise affected waste amounts per R-phrase is not available.

7.2 Affected waste amounts

7.2.1 Theoretical waste potential

For a quantification of the waste amounts that potentially could be affected by the different policy options it would be necessary to analyse which amounts of waste are classified as hazardous waste because of which R-phrase and H-criterion. No database is available that describes this for Europe.

In order to be able to have at least an approximation to the potentially affected waste amounts experience from stakeholders and national guidance documents were evaluated regarding the question which H-criteria are seen as potentially relevant for which waste types.

Data from 12 Member States that provided information about waste amounts per 6-digit waste code have then been linked with the information about potentially relevant H-criteria.

Further differentiation was done by identifying wastes that are always hazardous and those that are mirror entry wastes.

The figures below show the total and the relative potential relevance of the H-criteria for the characterisation of waste as hazardous waste. For example: It is appraised that criterion H7 could become relevant for the characterisation of 27 million tonnes of waste. Note: more than one H-criterion could be relevant for the characterisation of one waste type. Thus it is not appropriate to sum the amount of waste per H-criterion.

The most mass relevant H-criterion is H7. The second and third relevant criteria are H5 and H6 (23 and 22 million tonnes). 53% of the waste amounts that might become hazardous because of criterion H7 are always hazardous, 43% are hazardous wastes in mirror entries.

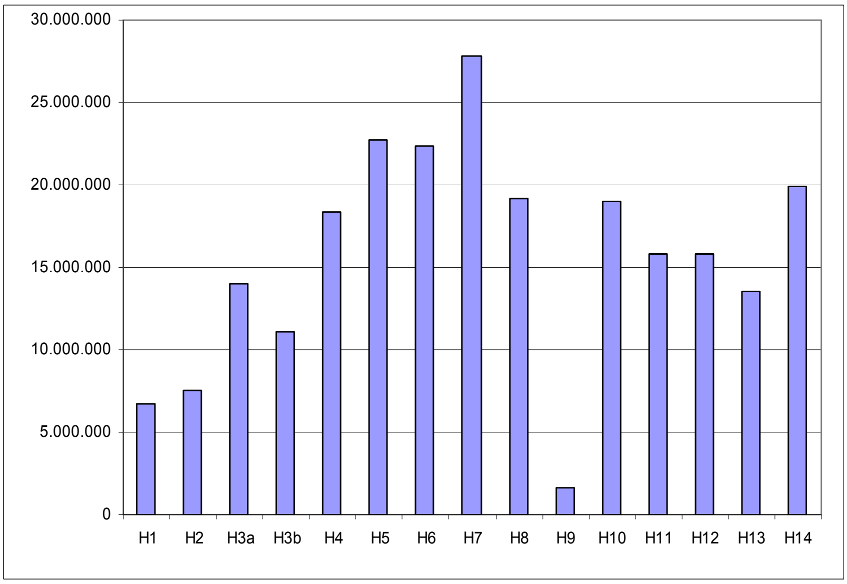

Figure 16: Waste amounts per H-criterion (tonnes)
(note: a waste might show more than one H-property. Thus it is not appropriate to sum up the amounts per H-criterion)

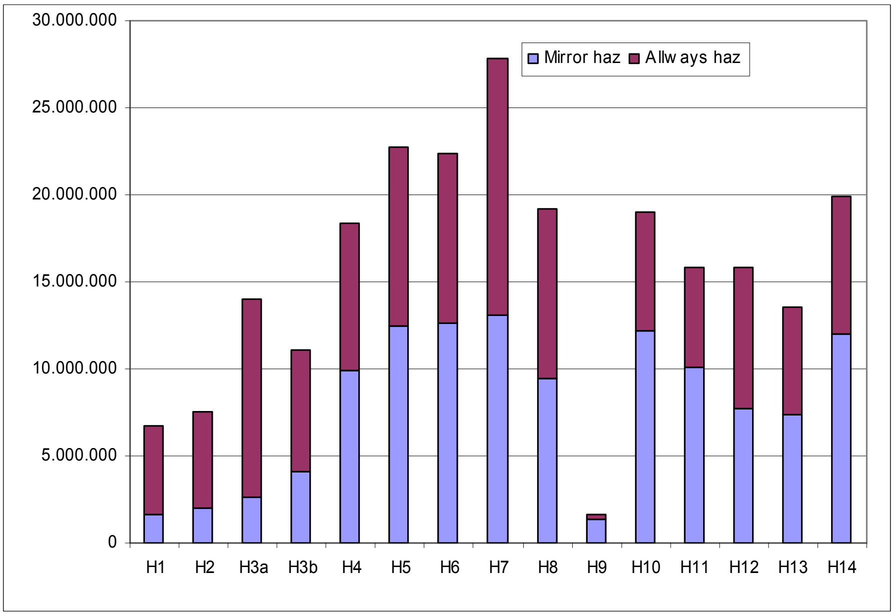

Figure 17: Waste amounts per potentially relevant H-criterion (tonnes) (aver. of 12 Member States)

The figures show European averages. The situation in the Member States differ significantly as shown in the figure below (averages over all H-criteria per Member State).

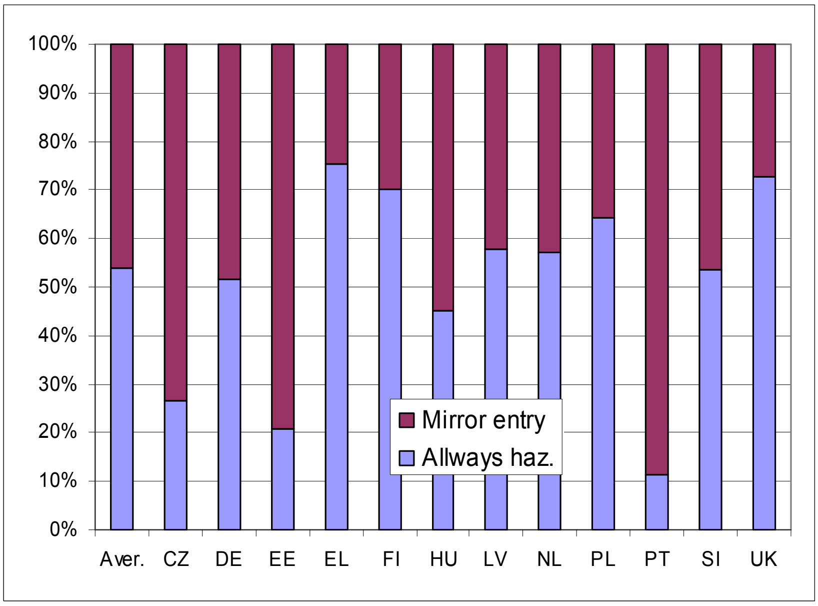

Figure 18: Mass relation between hazardous waste in mirror entries and always hazardous waste in 12 Member States (average of all potentially relevant H-criteria and wastes)

The analysis covers around 30 million tonnes of hazardous waste of a total of around 65 million tonnes. For the 35 million tonnes not included in this analysis no differentiated data are available. If it is assumed that the hazardous waste situation in the remaining Member States does not differ from the Member States already covered in the analysis the waste amounts shown in the table on the right can be appraised.

Table 31: Appraisal of the relevance of H-criteria for the characterisation of waste as hazardous (Amounts in million tonnes) (note: a waste can be affected by more than one H-criterion

	Total	Mirror haz	Always haz
Al	65	30	35
H1	15	4	11
H2	17	4	12
H3a	31	6	25
H3b	25	9	15
H4	41	22	19
H5	50	28	23
H6	50	28	22
H7	62	29	33
H8	42	21	21
H9	4	3	0
H10	42	27	15
H11	35	22	13
H12	35	17	18
H13	30	16	14
H14	44	27	18

The impacts of possible amendments of limit values for H-criteria are not cumulative in any case. As soon as a waste becomes hazardous because of one H-criterion the other H-criteria become irrelevant for the general classification of the waste. If a higher limit value for one criterion is set but the other H-criteria remain unchanged a hazardous waste will only be re-classified as non-hazardous waste if the changed H-criterion was the one considered for the classification of that waste.

In cases where the limit values are lowered by the new chemicals legislation additional waste amounts might become hazardous wastes. In order to appraise the potential of waste that could be affected the waste amounts assigned to non-hazardous mirror entries have been summed up with the same methodological approach as described for hazardous waste above. In some cases more than one hazardous mirror entry exists for one non-hazardous mirror entry (e.g. 01 03 04* + 01 03 05* + 01 03 06) or vice versa. This was taken into account by assigning the waste potentials twice or even thrice. As a result the figure below shows a more significant overestimation of potentially affected waste amounts per H-criterion than the figures for hazardous wastes.

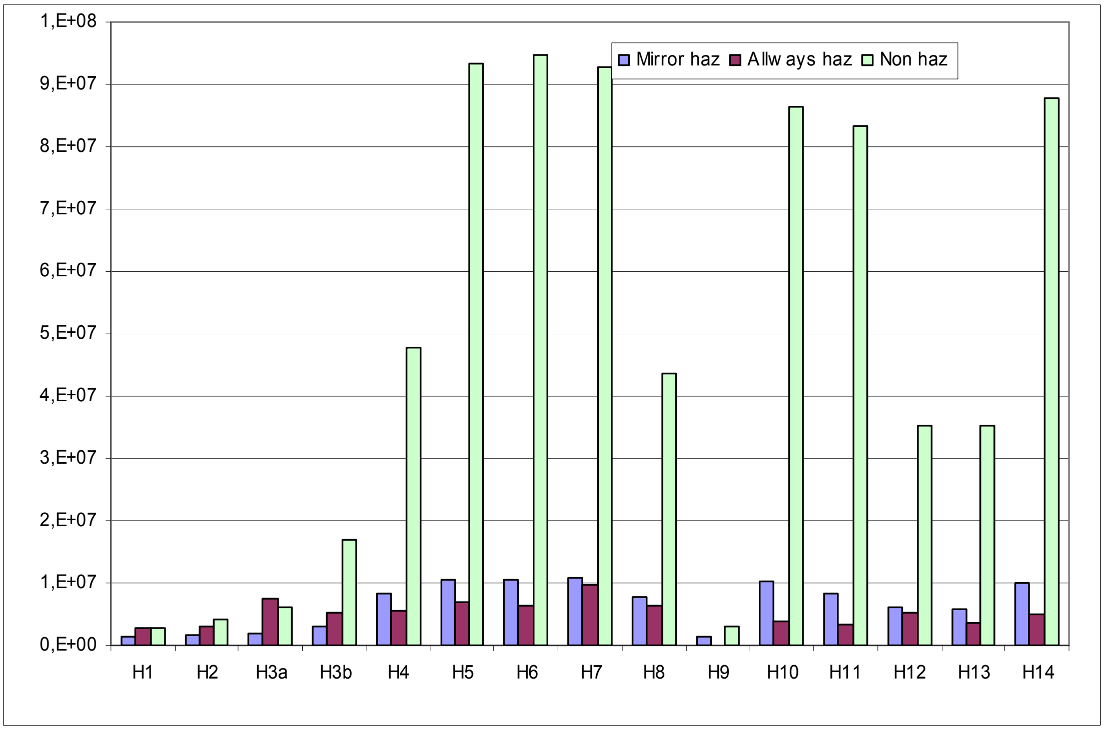

Figure 19: Potential of waste amounts including non-hazardous wastes from non-hazardous mirror entries which might be affected from a change of limit values
(lower limit values can have the effect that non-hazardous waste becomes hazardous waste) (data are average of 10 Member States)

7.2.2 Practical approach

The figures above show an extreme worst case scenario of potentially affected waste amounts.

Daily practice of the classification of waste in the Member States was described by stakeholders as follows:

- Often a waste is characterised as hazardous in order to avoid high costs for analysing the waste.
- In many cases a waste is characterised as hazardous because experience and process parameters say that it is hazardous.
- Because of high costs for analysing for all potentially relevant components and compounds the waste is characterised based on simplified approaches. This could be for example an approach, where the waste is analysed for elemental metals but not for metal compounds. The hazardousness of waste is then estimated based on expert judgement about the hazardous potentials. Similar approaches are reported for organic substances, where individual indicator substances are used instead of analysing for all potentially relevant hazardous substances.
- Only in few cases differentiated analysing is performed. This is most often done, when a waste producer expects that a waste does not show hazardous properties.

The stakeholder survey and expert discussions (see also volume one of this report) confirmed that quantifying data about the frequency of laboratory analysis are not available at the Member States. Starting from the Member States workshop performed in October 2008 expert judgements about the amount of waste actually classified based on laboratory analysis was collected. The results are depicted in the figure below. Differentiation between case 1 and 2 has not been made in most often. Regarding case 3 and 4 it must be taken into account that it was asked for analysis performed for the classification of waste in context of the LoW. It was stated that waste is often analysed because of other reasons (quality requirements of recovery processes, basic characterisation and compliance checks for landfilling of waste, etc.) (see also vol.1 of this report).

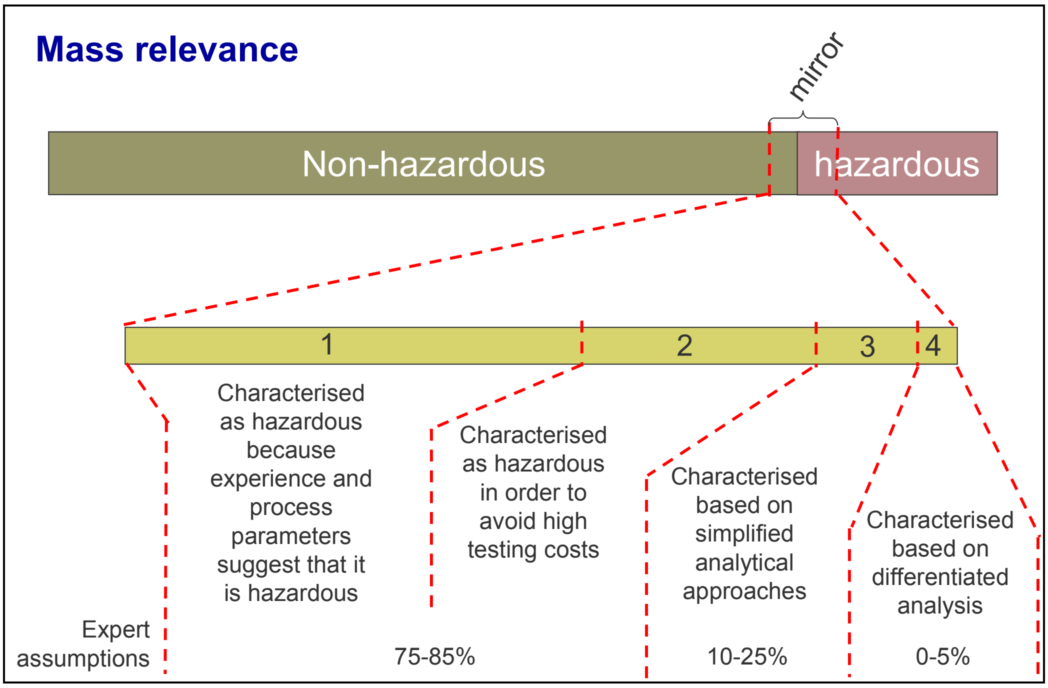

Figure 20: Mass relevance of classification approaches for hazardous wastes (Basis: Expert interviews)

In this more practical approach for the appraisal of potentially affected waste amounts smaller mass relevance from e.g. revised limit values is expected.

Quantitative data about the frequency of laboratory analysis for the characterisation of waste could be used as an approximation for the question how relevant analysis are for the characterisation of waste (in contrast to e.g. the characterisation based on knowledge about the origin, previous experiences and other knowledge).

7.3 Summary of impacts

The scenarios group individual measures. Differences between the scenarios are shown in an overview below.

Table 32: Overview: Differences of the scenarios

	Baseline	Scenario 2	Scenario 2a	Scenario 3
Basic principle of the link between LoW and CLP	H-criteria			Waste = mixture
Detailing of H-criteria	Partly	Yes		Specific provision for H9, H12, H15
Generic concentration limits	Annex I DSD, Art. 2 LoW	Annex CLP, Art. 2 LoW	Partly Annex CLP, partly own generic concentration limits	Annex CLP
Specific concentration limits	Annex I DSD	Annex CLP	Partly Annex CLP, partly own generic concentration limits	Annex CLP
Waste specific concentration limits	No	For POP containing waste, for H12, H15		For H12, H15
Guidance on characterisation	No	Yes; Including waste specific approaches		Yes via guidance for characterisation of mixtures in chemicals legislation

The table on the following pages provide an overview of the impacts of the scenarios per generic objective and/or impact category.

The analysis, the own research and investigations, the results from the stakeholder surveys and from stakeholder workshops and interviews showed that the data basis for a quantification of the impacts is weak. A qualitative assessment has been provided where detailed data are missing. The development of individual measures and scenarios has been possible even on a weak quantitative basis with sufficient confidence to achieve the intended effect.

In few cases a weak scientific data basis hindered the detailing of measures. This is especially the case for the simplification of characterisation of waste by analytical means (waste containing metal compounds).

Table 33: Impacts of scenarios per impacts category/objective

Objective / impact category	Baseline	Scenario 2	Scenario 2a	Scenario 3
Harmonisation of legislation (Waste legislation and chemicals legislation)	Far reaching but outdated harmonisation by combining H-criteria from waste management (WFD, LoW) with classification and R-phrases of DSD and DPD; 3 H-criteria are not reflected in chemicals legislation; one R-phrase in Article 2 is not in line with chemicals legislation (R40 in the bullet point on mutageneity).	Far reaching and updated harmonisation by combining H-criteria from waste management (revised WFD, LoW) with hazard classes and categories of CLP Regulation; 3 H-criteria are not reflected in chemicals legislation	Updated link. The objective of harmonisation of legislation (and with this the simplification of legislation) is achieved regarding the updating to the H-classes and H-categories of the CLP; It is not achieved regarding the limit values for 6 of 24 hazard classes /-categories.	Full and consistent alignment of the classification of waste with the classification of mixtures.
Harmonisation of classification practice in Member States	Legislation provides a common legal basis for classification of waste. Practical application in the Member States differs because of missing guidance.	Further harmonisation is achieved from a European Guidance Document on classification of waste, from waste specific concentration limits for classification of POP containing wastes, from guidance on solving classification issues and from application of a common generic characterisation strategy. (Additional aspects are considered in volume 3 of this report regarding effects from revised entries and structure of the LoW).		
Administrative and financial efforts	In all Member States classification based on DSD and DPD is an established daily practice.	Change from existing system to system of hazard classes and categories results in additional one-off efforts for changing characterisation routines compared to the baseline scenario.	Least one-off efforts from new system. Increased efforts compared with scenario 2 can result in the mid term perspective from incomplete harmonisation.	Change from existing system to system of hazard classes and categories results in one-off efforts for changing characterisation routines. Potentially more differentiated approach and thus requires potentially more time and expertise
		Less continuity than in scenario 2a. A fixed link between waste legislation and chemicals' legislation via H-criteria and a correspondence table (R-phrases → hazard classes/ -categories) provides more continuity than the deletion of the existing H-criteria system as in scenario 3.	Continuity with existing situation is achieved.	Least continuity of the three scenarios. In the case of recurring wastes additional efforts result when the characterisation of waste has to be changed from the H-criteria to full hazard classes /categories alignment. Confusion about mismatches and differences in systems would be avoided

Objective / impact category	Baseline	Scenario 2	Scenario 2a	Scenario 3
	Other H-criteria (H9, H12, H15) are partly operationalised in the Member States	Further detailing of H-criteria results in reduction of administrative efforts for classification through harmonisation and simplification		
		Harmonisation of classification approaches in the Member States will result in reduced administrative efforts in multinational companies where centralized waste management is realised and in multinational waste companies that are involved in trans-frontier shipment of waste		
				.
operating costs and conduct of business; trade and investment flows		Higher costs compared to the baseline scenario can result when additional waste become hazardous waste as a result of lower limit values in 6 of 24 hazard classes /-categories. Daily practice in waste management as well as the application of the generic characterisation strategy and simplified classification approaches show that very little or no effect is to be expected from the revised values. Further harmonisation of approaches in the Member States is expected to result in positive effects for competitiveness and conduct of business.	No change of costs compared to baseline scenario	Similar to impact of scenario 2
Competitiveness	Distortion of competitiveness might result from different classification procedures on Member States level	Harmonised classification procedures might result in reduced distortion of competitiveness.		
		No or minor impacts are expected from lowered concentration limits for some hazard classes /-categories since all waste producers of comparable production lines are affected in a comparable degree. If at all a competitive advantage could result in cases where the amount of hazardous waste per production unit is lower than in comparable production processes of other companies.	No impact compared to baseline scenario	As scenario 2

Objective / impact category	Baseline	Scenario 2	Scenario 2a	Scenario 3
Environment		No difference to the baseline scenario regarding the basic approach (H-criteria vs. direct application of Hazard classes and – categories can be observed.		
		Some elements of the new CLP do not match with existing DSD and DPD system. No direction of potential impacts (increased/reduced level of environmental protection) can be identified	As scenario 2	As scenario 2
		Some generic concentration limits are lower in CLP Regulation than in DSD/DPD. The waste management practice and the fact that most wastes are not characterised by precise and detailed analysis but by appraisals or simplified approaches lower the magnitude of the impact	In some cases products (mixtures) will be classified hazardous at lower concentrations than wastes.	As scenario 2
		Updated link and new limit values take up new scientific knowledge about classification of substances.	Updated link takes up new scientific knowledge about classification of substances. and New limit values are not taken up.	Updated link and new limit values take up new scientific knowledge about classification of substances.
		The static link between H-criteria and hazard classes and categories could lead to a delayed consideration of new developments/ knowledge in waste management (e.g. delay until the next review cycle of the LoW).		The dynamic link between waste and chemicals legislation would ensure that new developments are taken into account

Table 34: Assessment of scenarios 2, 2a and 3 relative to the baseline scenario

<table>
<tr><th colspan="2">Objective / impact category</th><th>Scenario 2</th><th>Scenario 2a</th><th>Scenario 3</th></tr>
<tr><td colspan="2">Harmonisation of legislation (Waste legislation and chemicals legislation)</td><td>+</td><td>+/-</td><td>++</td></tr>
<tr><td colspan="2">Harmonisation of classification practice in Member States</td><td colspan="3">+</td></tr>
<tr><td rowspan="2">Administrative and financial efforts</td><td>change to new system in general</td><td>-</td><td>0</td><td>- -</td></tr>
<tr><td>Change to revised criteria H9, H12 and H15</td><td colspan="3">+</td></tr>
<tr><td colspan="2">operating costs and conduct of business; trade and investment flows</td><td>-/0</td><td>0</td><td>-</td></tr>
<tr><td rowspan="2">Competitiveness</td><td>Distortion of competitiveness (supra-national)</td><td colspan="3">+</td></tr>
<tr><td>Distortion of competitiveness (national)</td><td>0/(+)</td><td>0</td><td>0/(+)</td></tr>
<tr><td rowspan="4">Environment</td><td>Basic system</td><td colspan="3">0</td></tr>
<tr><td>Differences of classifications</td><td colspan="3">?</td></tr>
<tr><td>Portion of waste under stronger control regime</td><td>+</td><td>-</td><td>+</td></tr>
<tr><td>Consideration of new knowledge about classification of substances</td><td>+</td><td>-</td><td>+</td></tr>
</table>

("+" = positive impact, "-" = negative impact, "0" = levelled impact)

Summarising it can be stated that scenario 3 achieves the best harmonisation of legislations. This is, however, connected with additional efforts for characterisation of waste and, with this, additional costs. At the same time no environmental benefits could be identified which would balance these additional efforts.

Simplification of the classification process as realised in scenario 2 (compared to chemicals legislations' classification in scenario 3) is especially relevant for SME.

The impact on administrative efforts for public authorities would be lowest in scenario 2a. This scenario shows at the same time the lowest environmental benefit of the three scenarios.

In general the need for action on EU level results from the update of chemicals legislation (here DSD/DPD → CLP) which is the major basis for the classification of waste. This results in the need to update the European List of Waste and Annex III of the revised Waste Framework Directive.

The simplified analytic approaches for the classification of waste as described in chapter 6.2.6.2.1 holds a large potential for reduced efforts for the characterisation of waste. Improving the data basis for this measure in order to enable an informed decision on European level is seen as a priority task.

8 Summary of results

Two scenarios (in addition to the baseline scenario 1) have been developed and analysed regarding their potential impacts.

Scenario 2

- The list of H-criteria in Article 2 of the LoW is updated with the corresponding hazard classes and hazard categories of CLP.
- For H-criteria that are mentioned in Annex III of the revised WFD for which no appropriate correspondence exist in the CLP Regulation specific provisions are included in the LoW.
- Note 1 of Annex III of the revised WFD is amended as follows in order to link the hazardous properties with the CLP regulation: “Attribution of the hazardous properties H1 – H8, H10, H11, H13 and H14 is made on the basis of the criteria laid down by Article 3 of the CLP regulation”
- The term “preparation” is replaced by the term “mixture” in the revised WFD and the LoW and the term “dangerous” by “hazardous”.
- Criterion H9 is updated as follows

Table 35: Summary - Criterion H9

Topic	Existing Legislation	Proposal for a revised text / approach	Comments
Definition	Substances containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms.	Wastes containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms]	The definition must be accompanied by clear definition of terms in order to achieve harmonised implementation
Definitions for terms	Not available	• "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 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" - This includes Animals, but not plants.	
List of origins and waste types	Not available	Lists to be included in a EU guidance document	

- Criterion H12 is amended as follows:

Table 36: Summary - Criterion H12

Topic	Existing Legislation	Proposal for a revised text / approach	Comments
limit value	Not available	1 l of gas per kg of waste and hour	The value is set as a convention.
List of most relevant gases + hazard statements of CLP	Not available	Include list in guidance document	
Non exhaustive list of relevant substances	Not available	Include list in guidance document	

- Criterion H15 is amended as follows

Table 37: Summary - Criterion H15

Topic	Existing Legislation	Proposal for a revised text
Definition	Substances and preparations capable by any means, after disposal, of yielding another substance, e.g. a leachate, which possesses any of the characteristics listed above.	Waste capable of yielding a substance at disposal which exhibits one or more of the hazards defined in Annex III of Directive 2008/98/EC
Concentration limits	Not available at European level	maximum concentration values for hazardous waste on non-hazardous landfills according to section 2.3 "Criteria for hazardous waste acceptable at landfills for non-hazardous waste pursuant to Article 6(c)(iii)" in the Annex to Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC (2003/33/EC)
Test methods	No available	Reference to Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC (2003/33/EC) and the applied leaching test methods as provided in section 3. SAMPLING AND TEST METHODS

- Criterion H14 is amended as follows

Table 38: Summary - Criterion H14

Topic	Existing Legislation	Proposal for a revised text / approach	Comments
Definition	"substances and preparations which present or may present immediate or delayed risks for one or more sectors of the environment"	"waste which presents or may present immediate or delayed danger to the environment "	The term "risk" does not seem to be appropriate because the property H14 is seen as an intrinsic property.
Link of definition with chemicals legislation	Reference to DSD/DPD	Update of the link is part of the general update as described in chapter 6.2.1 of this report	
Test methods	No method for biotests available	Fixed test battery for biotest	
Concentration limits / limit values	No value for biotests available	National approaches with evaluation period	

Table 39: Proposal for a test battery

Test system	Reference	Test organism	Endpoint	Toxicity criteria
Aquatic tests for waste eluate testing				
Determination of the inhibition of the mobility of *Daphnia magna* Straus (Cladocera, Crustacea) - Acute toxicity test	DIN EN ISO 6341	Daphnia magna	Immobilisation	10%
Freshwater algal growth inhibition test with *Scenedesmus subspicatus* and *Pseudokirchneriella subcapitata*	DIN EN ISO 8692	*Scenedesmus subspicatus* or *Pseudokirchneriella subcapitata*	Growth	20%
Determination of the genotoxicity of water and waste water using the umu test	ISO 13829	*Salmonella*	Gen induction	Dmin ≥ 2
Terrestrial tests for solid waste testing				
Soil quality - Determination of the effects of pollutants on soil flora -Part 2: Effects of chemicals on the emergence and growth of higher plants	ISO 11269-2	*Brassica napus* (only one species)	Growth	30%
Soil quality - Avoidance test for determining the quality of soils and effects of chemicals on behaviour -- Part 1: Test with earthworms (*Eisenia fetida* and *Eisenia andrei)*	ISO 17512-1 (2007a)	*Eisenia fetida/ Eisenia andrei*	Behaviour	20%
Solid contact test with *Arthrobacter globiformis*	DIN 38412-48 (2002) ISO 10871 (2008)	*Arthrobacter globiformis*	Dehydrogenase activity	20%

Remarks:
For the Extended Limit Test System only one plant species shall be tested.
The umu test is the only genotoxicity test suggested for the Extended Limit Test System, because of limited experience with other genotoxic test systems. It might be replaced after additional scientific investigations.

Presently, no sufficiently broad data basis is available to determine limit values for bio-testing according to H14. It is proposed to include the test battery including the scientifically derived and test specific toxicity criteria as binding test method in the revised LoW (no link to chemicals legislation is possible at this point). The revised LoW shall require that Member States fix own limit values for the hazard classification based on biotests or alternatively apply a yes/no decision (waste shows effect in limit tests/shows no effect in limit tests). The results in the Member States shall be communicated to the European Commission. A review of these provisions should be done after three years.

- Regarding generic concentration limits the list of substance properties in Article 2 of the LoW is replaced by the following list.

Table 40: Generic concentration limits – proposal for a revised Article 2 of the LoW

H-criterion	Specification	Additivity
H3 Flammable	flash point ≤ 55°C,	
H6 Toxic	substances classified as acute tox. Cat.1 or acute tox. Cat.2 or STOT single 1 (T+) at a concentration ≥ 0,1 %, substances classified as acute tox. Cat.3 or STOT single 1 (T) or STOT rep. Cat.1 at a concentration ≥3%,	Yes
H5 Harmful	substances classified as acute tox. Cat. 4 or STOT rep. 2 at a concentration ≥ 25 % ,	Yes (incl. H7)
H8 Corrosive	substances classified as skin corr. Cat.1A at a concentration ≥ 1%, corrosive substances classified as skin corr. 1B at a concentration ≥ 5%,	Yes (incl. H4)
H4 Irritant	substances classified as eye damaging cat.1 at a concentration ≥ 3%, substances classified as eye irrit. Cat. 2 or skin irrit. Cat.2 or STOT single Cat.3 at a concentration ≥ 10%,	Yes (incl. H8)
H7 Carcinogenic	substances classified as carcinogenic cat. 1A or 1B at a concentration ≥ 0,1 %, substances classified as carcinogenic cat. 2 at a concentration ≥ 1 %,	
H10 Reprotoxic	substances classified as reprotoxic cat. 1A or 1B at a concentration ≥ 0,3% substances classified as reprotoxic cat. 2 at a concentration ≥ 3%	
H11 Mutagenic	substances classified as mutagenic cat. 1B at a concentration ≥ 0,1 %, substances classified as mutagenic cat. 2 or STOT single cat. 2 at a concentration ≥ 1 %,	
H13 Sensitising	substances classified as Resp. sens. Cat.1 or Skin. sens Cat.1 at a concentration ≥ 1 %,	

- Regarding specific limit values it is proposed to amend Note 2 of Annex III of the revised WFD by adding the text: “Where relevant the limit values according to Annex VI of the CLP Regulation and the European Classification and Labelling Inventory shall apply
- Waste specific concentration limits are introduced as a new instrument in the LoW:

Table 41: Proposed limit values specific for waste management purposes

Substance	Hazardous waste if concentration of the substance is above…
PCDD/F	10 µg/kg
TOXAPHENE	2.5 mg/kg
MIREX	25 mg/kg
ENDRIN	2.5 mg/kg
DIELDRIN	2.5 mg/kg
DDT	2.5 mg/kg
CHLORDANE	2.5 mg/kg
ALDRIN	25 mg/kg

- The number of entries where individual characterisation of the waste is necessary is minimised. Therefore the entries of the LoW: 10 03 22, 10 03 24, 10 03 26, 10 03 28, 10 09 16, 10 10 14, 10 10 16, 11 01 12, 19 13 04 are deleted. As a consequence the corresponding hazardous mirror entries become absolute entries.
  The possibility for the waste producer to opt out (to provide evidence that his specific waste is non-hazardous) should be included as an explicit provision in the revised LoW.
- The analytical efforts for the characterisation of waste shall be minimised by applying simplified approaches. It is to be stated that no sufficient scientific basis is available yet to justify specific factors in such an approach on European level. The potential for a reduction of analytic efforts and the need to reach a harmonisation of widely varying approaches in practice in the Member States (see volume 1 of this report) advices to initiate further research. As a first step discussion about possible factors agreed as convention between experts is advised in order to avoid too long delay and to cope with the great importance of such an approach.
- Regarding the characterisation of tar containing waste it is to be stated that no sufficient scientific basis is available to set limit values based on scientific ground on European level. Support for the finding of a convention on European level in form of quantified impacts (amount of affected waste depending on the limit value) should be developed based on comparable analytical results from different Member States. If the research reveals that significant variations in the composition of the wastes occur it is proposed to take no action on European level but on national level where necessary.
- Given the broad variety of application fields and the need to provide concrete and adapted definitions in order to actually provide practical support it is proposed to solve the issue of missing definitions for the terms “solid”, “sludge”, “liquid” and “suspensions” in the context of the concrete waste management activity. Including all potentially relevant definitions in a revised LoW or a guidance document would render these documents voluminous and with limited usability.
- Regarding the assignment of Batteries to entries of the LoW and the classification of batteries it is proposed to amend the section 16 06 of the LoW as follows:

16 Wastes not otherwise specified in the list
16 06 Batteries and accumulators
16 06 01* lead batteries
16 06 02* Ni-Cd batteries
16 06 03* mercury-containing batteries
16 06 04 discharged alkaline and zinc carbon cells (except 16 06 03, 16 06 05)
16 06 05* batteries and accumulators other than those mentioned 16 06 01, 16 06 02 and 16 06 03 containing hazardous substances
16 06 06* mixed batteries and accumulators
Entries 09 01 10 (single-use cameras without batteries), 09 01 11* (single-use cameras containing batteries included in 16 06 01, 16 06 02 or 16 06 03) and 09 01 12 (single-use cameras containing batteries other than those mentioned in 09 01 11) are subject to be deleted.

- Regarding the determination of composition of heterogeneous waste the issue of variability of waste composition needs further research to develop a comprehensive basis for handling of variability of waste composition and the classification of waste that can be used in a European Guidance Document on the characterisation of waste and the assignment to entries of the LoW.
- A generic characterisation strategy has been developed to be included in an Annex of the revised LoW in order to ensure harmonised characterisation process and minimisation of efforts for a reliable characterisation of waste.

Scenario 2a keeps the generic concentration limits as they are presently in Article 2 of the LoW while scenario 2 changes 6 of 24 values.

Scenario 3 replaces the existing system of H-criteria of the revised Waste Framework Directive by a direct link to the CLP Regulation. Wastes are treated in this scenario like mixtures.

The table below provides an overview of scenarios 2, 2a and 3 and the related impacts.

Table 42: Grouping of measures in the scenarios - overview

	Scenario 2	Scenario 2a	Scenario 3
Basic principle of the link between LoW and CLP	H-criteria		Waste = mixture
Detailing of H-criteria	Yes		Specific provisions only for H9, H12, H15
Generic concentration limits	Part of LoW in line with Annex of CLP Regulation	Part of LoW; partly in line with Annex of CLP regulation, partly proprietary limit values	Link to Annex CLP
Specific concentration limits	Annex CLP		Annex CLP
Waste specific concentration limits	For POP containing waste, for H9, H12, H15		
Guidance on characterisation	Yes; Including waste specific approaches		Yes via guidance for characterisation of mixtures in chemicals legislation

Table 43: Assessment of scenarios 2, 2a and 3 relative to the baseline scenario

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<tr><th colspan="2">Objective / impact category</th><th>Scenario 2</th><th>Scenario 2a</th><th>Scenario 3</th></tr>
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<tr><td colspan="2">operating costs and conduct of business; trade and investment flows</td><td>-/0</td><td>0</td><td>-/0</td></tr>
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Summarising it can be stated that scenario 3 achieves the best harmonisation of legislations. This is, however, connected with additional efforts for the characterisation of waste. At the same time no environmental benefits could be identified which would balance these additional efforts.

Simplification of the classification process as realised by the waste specific classification process as applied in scenario 2 (compared to chemicals legislations' classification in scenario 3) is especially relevant for SME.

The impact on administrative efforts for public authorities would be lowest in scenario 2a. This scenario shows at the same time the lowest environmental benefit of the three scenarios.

Review of the European List of Waste

Final Report

Volume III

Review of structure and entries of the LoW

November 2008

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1 Introduction

This volume summarises the result from task 3 of the TOR which is to outline an option, by which the identifier "waste origin" is detached from the six digit waste code. The remaining content of the code shall be structured in a material oriented way or in 'another way. An option to be assessed in the course of task 3 is the material oriented structure as it is applied in Annex VIII and IX of the Basel Convention.

Since the types and the number of the individual entries are closely related to the structure of the whole list this part also comprises the results from task 3.2.4 “Adding and deleting codes” regarding:

- Introduction of new codes for “other hazardous waste otherwise not specified” with the ending “98”;
- Introduction of new codes in the LoW that accord with the definitions and requirements of other waste legislation;
- Consideration of CO_2 captured for geological storage being expressly specified in the LoW;
- Removal of unnecessary codes from the LoW including general entries ending with “99”.

2 Rationale for an amendment of the LoW

In the survey performed in the course of this study study stakeholders have been asked, inter alia, which are according to their experience the most serious classification problems resulting from LoW application. The answers can be grouped as follows:

- Problems resulting from the structure of the LoW and the classification procedure;
- Problems concerning the classification of hazardous waste and the application of mirror entries;
- Problems resulting from the lack of suitable waste codes;
- Ambiguous classification on account of two or more possible codes;
- Problems resulting from unclear or imprecise definitions.

For details see this report volume 1 chapter 2.6.

In addition to non-governmental organisations addressees of that survey have been Member States on the national level. In the years 2006 a survey has been performed where the addresses have been competent authorities on regional/local level and stakeholders that work with the LoW in their daily business. The survey was developed, inter alia, based on an operationalisation of the objectives of the LoW. According to Commission Decision 94/3/EC the function of the European Waste Catalogue is …

"… *to be a reference nomenclature providing a common terminology throughout the Community with the purpose to improve the efficiency of waste management activities.*" [Commission Decision 94/3/EC]

Using waste codes as common terminology for the communication about waste properties comprises two steps:

a) encoding of properties, where the waste producer transfers the available information about a waste into the waste code (actually chooses a waste code) and

b) decoding of properties, where the users reconstruct information about the waste properties from the waste code.

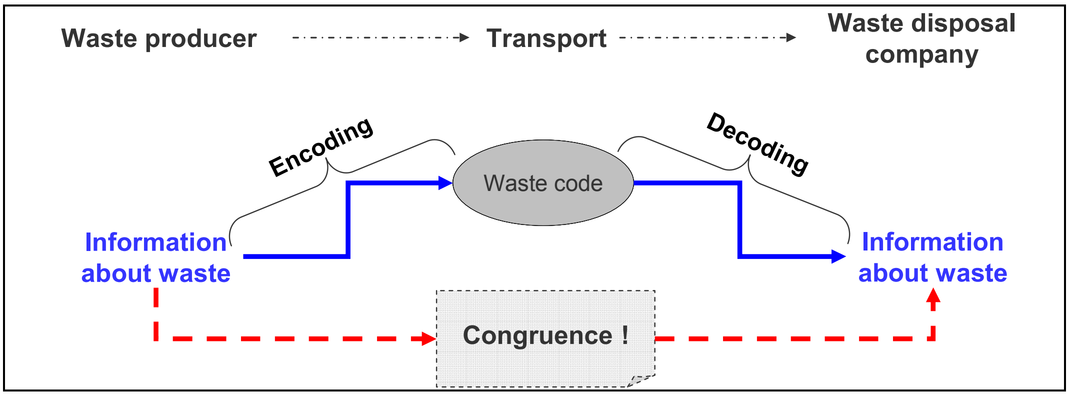

Figure 1: Visualisation of the communication function of waste codes

The present structure of the list based on the criterion "origin" intended to support an easy **encoding**.

Each party involved in the communication process has different expectations from a list of waste codes regarding the type of information and the degree of detail.

- The waste producer expects a list, which enables quick and simple assignment of waste to waste codes, gives legal certainty and avoids duplication of work (e.g. regarding communication with waste recycler about the composition of the waste and its recyclability).
- Transport of waste requires information about the need for specific risk management requirements. The waste code serves mainly as a linking tool that facilitates access to information in other documents like the "European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)". Communication about hazardous waste compounds and properties is often supported by consignment notes, which describe the waste and its properties more detailed than the entry of the LoW.

- Recovery and final disposal installations need information about valuable components of the waste, polluting and other components that might influence their specific process (e.g. components that develop corrosive properties in the recovery process, calorific value, leaching behaviour).
- Authorities that are involved in permitting of installations expect information about parameters of the waste which influence the environmental profile of the installation and about necessary risk management measures.
- Monitoring and controlling authorities require coding systems that support monitoring and steering of waste in line with the national and/or European waste policy.

The **decoding** process performed by waste management companies and authorities often needs knowledge about the process where the waste has been generated and the usual composition of the waste from those processes. The text of the entries does not deliver sufficient information to fulfil the requirements of the different involved parties in most of the cases.

In two informal TAC meetings (November 2005 and May 2006) the general objective of the LoW to serve as a communication nomenclature has been discussed by Member States and put into more concrete terms. According to this source the LoW shall:

- "support an easy/simplified classification of wastes with regard to their environmental properties and hazardousness (…)",
- (Serve as an) "Instrument, which supports an efficient waste management (includes inter alia steering of wastes and the achievement of environmental objectives)",
- "Contribute to transparency and improved monitoring of waste streams for control purposes",
- (Serve as a) "supportive instrument for the verification of the effectiveness of European regulations with regard to specific waste streams",
- (be an) "important part of installation permits with regard to an environmental sound applicability of wastes in the respective process",
- (be a) "basis for waste statistics regarding, generation, treatment, recovery and final disposal of waste aiming at delivering statistical information for policy makers and industry association (policy performance)" [Ökopol 2006].

Resulting from workshops and stakeholder discussions in the years 2005 to 2006 the following major issues with the application of the LoW have been identified [Ökopol 2006]: i) a limited usability, ii) ambiguity of entries, iii) complexity of the assignment procedures, iv) ambiguity in the communication via waste codes[1] and v) differences in the application of the LoW in the Member States have been mentioned. The magnitude of the shortcomings of the LoW was surveyed via a questionnaire which was sent to 249 competent regional authorities and to industrial waste producers. The return rate was around ~30%. The results from the survey

1 e.g. with regard to loss of information in the encoding and decoding of waste codes

were complemented by around 30 phone interviews aiming at collection of additional answers/information and further verification and evaluation.

The addressees of the questionnaire have been asked regarding their experience with 13 exemplary issues with the application of the LoW (see below).

1	A waste code for a hazardous waste is sought via the four-step-approach. None is found. Therefore the waste is classified under the 99 waste code of the respective industrial activity.
2	Subsequent to a treatment within a waste treatment facility a waste is re-classified under a very general waste code of chapter 19 (waste from waste management facilities…). Due to this assignment, important waste-related information is lost.
3	Using the four-step-approach a waste has been classified according to its origin under a general waste code; even though more suitable waste codes for waste management purposes are available in other sections of the EWL.
4	Wastes being classified with the same general waste code are treated within different disposal routes (recovery resp. disposal). An adequate steering of the wastes might be problematic resp. additional instruments are needed for steering of the waste.
5	A waste with hazardous characteristics is only represented as a non hazardous waste in the EWL (no mirror entry available).
6	A waste is characterised as non hazardous waste when each H-criterion is applied individually. If all existing hazardous substances are summed up, the waste could be environmentally hazardous.
7	Waste with identical composition is classified as a hazardous waste within one Member State resp. Region and as non-hazardous within another.
8	Concentration limits of the H-criteria stem from the chemical substance law. In some cases they are too high for waste management purposes. Waste might be classified as being non-hazardous even though the concentration of hazardous substances is considered to be too high for environmental and waste related objectives
9	The testing methods for the H-criteria are used differently upon Member States; therefore identical wastes are also classified differently.
10	The requirements for transport and waste treatment are the same for a waste and its mirror entry. In spite of this the waste is analysed with great expense in order to decide whether the waste is hazardous or not.
11	Identical wastes are assigned to different waste codes listed in different chapters or main chapters of the EWL.
12	Economical reasons lead companies to assign wastes to general waste codes which can be disposed of cheaper than more specific waste code (which are available in the EWL). Furthermore waste codes are chosen according to the permitted waste codes of the subsequent treatment facility and not according to the specific code.
13	The section in the EWL that is relevant for the industry sector does not comprise a suitable specific waste code. Therefore a specific waste code of another section of the EWL is used.
[Ökopol 2006]	

Cases 1, 2, 5, 11, 12 and 13 were known to more than 70% of the answerers from own experience. Cases 7, 9 and 10 showed the lowest awareness level.

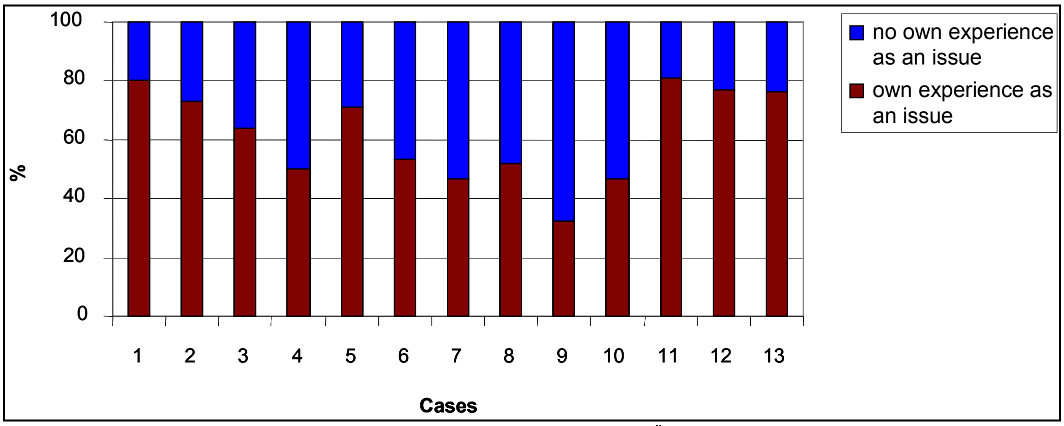

Figure 2: Experience of answerers to questionnaire with cases 1 to 13 [Ökopol 2006]

Most of the answerers that experienced the described exemplary cases as an issue answered that they see them as relevant. Lowest importance (below 60% positive answers) and most "not-important" answers (≥15%) was seen with cases 10 and 13. Highest importance (>70% positive answers) was seen for cases 1, 2, 3, 7, 9 and 12.

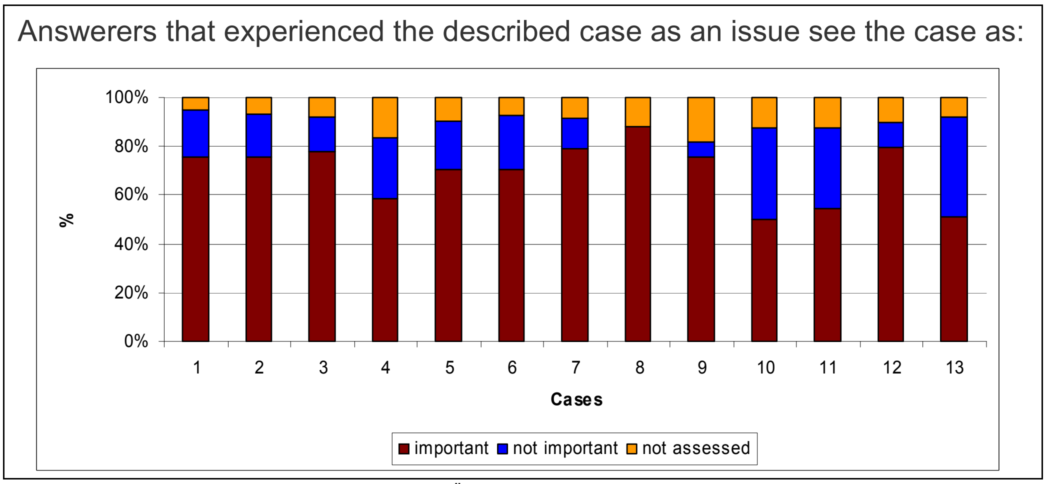

Figure 3: Importance of the cases 1 to 13 (I) [Ökopol 2006]

Answerers that did not experience the cases as an issue partly reported whether they see the issue as important. For all cases except case 3 and case 4 the majority of answerers that assessed the issue saw it as important.

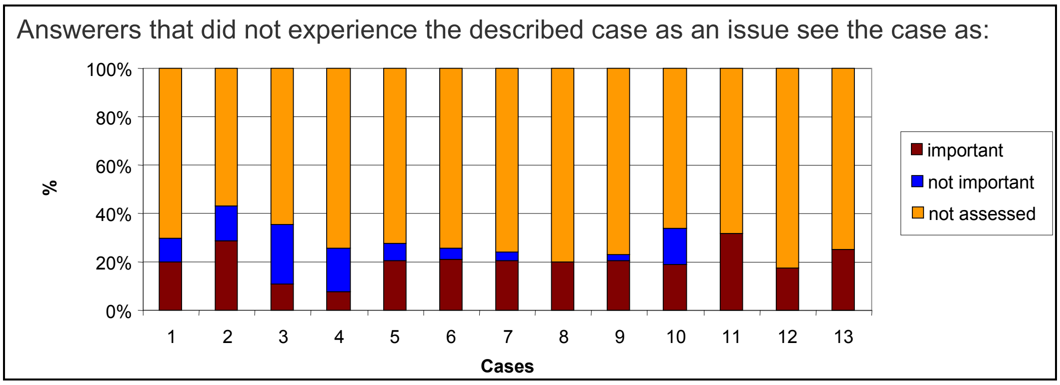

Figure 4: Importance of the cases 1 to 13 (II) [Ökopol 2006]

3 The Approach

The following sections develop different policy options for improving the operation of the LoW and analyse the impacts of potential measures.

Two scenarios have been developed which are analysed according to the Commission's impact assessment guidelines. An approach comprising the following four steps was adopted:

1. identifying which impact categories (from those included in the Impact Assessment Guidelines) are expected to be relevant to the scenarios for improving the operation of the LoW;
2. screening the impacts to identify those that may apply to each stakeholder group (business, consumers, public authorities and the environment);
3. describing the impacts qualitatively using matrices of measure versus impact categories (e.g. competitiveness, trade, administrative burden, etc.); and
4. providing qualitative analysis of the impacts.

By screening the potential impacts of the measures on different stakeholder groups, we have identified the following priority impact categories:

1) Economic impacts: Priority economic impact categories for the analysis are competitiveness, trade and investment flows, operating costs and conduct of business as well as administrative costs on businesses and public authorities. Little relevance is seen for the categories competition in the internal market, specific regions, consumer and households. No relevance can be appraised for the categories property rights, third countries, international relations, innovation and research and macroeconomic environment.

2) Environmental impacts: Priority environmental impact categories for the analysis are waste production/generation/recycling, air, soil and water quality, environmental risks, soil quality and animal health. Less relevance is seen for the impact categories food and feed safety (as far as not related to the category "soil quality"), renewable or non-renewable resources. No relevance is seen for the categories climate, use of energy, landscapes, land use, mobility (transport modes), biodiversity, flora and fauna.

3) Social impacts: Priority impact category for the analysis is occupational health and safety. It is covered in this analysis in the section about environmental impacts. Categories with minor or without relevance are expected to be employment and labour markets (as far as not already covered by the priority economic impact categories), standards and rights related to job quality, social inclusion and protection of particular groups, equality of treatment and opportunities, good administration, non-discrimination, private and family life, personal data, governance, participation, access to justice, media and ethics, crime, terrorism and security, access to and effects on social protection, educational systems.

The definitions of these categories are given in vol.4 Annex 17 to this report. Note that the impact categories above are not all relevant across all stakeholder groups.

The impact category "administrative efforts from revised LoW" is not relevant for private households.

Different exemplary stakeholder types have been defined taking into account that the impacts of policy options might differ e.g. regarding size of company and IT equipment of the stakeholder. This is most relevant in the context of the analysis of administrative efforts. The differentiation makes it also possible to take account of the specific situation of small and medium sized enterprises:

a) Small waste producer like crafts enterprise with one off wastes. Usually support from waste management companies is available for the assignment of waste to appropriate codes when an appropriate disposal path is identified.

b) Large waste producers with recurring wastes, staff member who is responsible for waste management, IT-system that serves for internal management of wastes and which has an interface for external waste codes.

c) Small waste management companies without sophisticated IT-system. Here in any case recurring waste types will be the predominant case.

d) Large waste management companies with IT-system that works with internal article codes and a defined article master. As for large waste producers an interface between internal and external codes is used.

e) Authorities that permit and control installations.

f) Authorities that monitor and control waste flows (including transboundary waste flows).

Regarding environmental aspects the outcome from recent discussions about improving the operation of the LoW has been operationalised in the TOR by providing the following criteria for the assessment of measures:

- "Does the measure support an easy/simplified classification of wastes with regard to their environmental properties and hazardousness?[2]
- Does the measure support the assessment of environmental impacts arising from the waste in the context of its impacts during its whole life cycle?
- Does the measure support that an efficient waste management is ensured or can be achieved (includes inter alia steering of wastes and the achievement of environmental objectives)?
- Does the measure contribute to transparency and improved monitoring of waste streams for control purposes?
- Does the measure support the verification of the effectiveness of European regulations with regard to specific waste streams?
- Does the measure affect the installation permits with regard to an environmentally sound applicability of wastes in the respective process?
- Does the measure support the functioning as basis for waste statistics regarding, generation, treatment, recovery and final disposal of waste aiming at delivering statistical information for policy makers and industry association (policy performance - closely linked to the efficiency of waste management)?
- Does the measure affect existing and implemented waste management legislation in the Member States?
- Does the measure affect other Community waste legislation, for instance the Waste Shipment Regulation (EC) No 253/93?
- Does the measure provide for flexibility to detail the codes agreed on the EU level by country specific (sub) entries?"

[TOR]

[2] Improvement of the classification is related to the support of the classification of a waste by the entries of the list. The classification by analysis and/or testing is discussed in volume 2 of this report.

4 Policy options

Baseline scenario

This baseline scenario describes the situation with the list of waste in its present state (after amendment of the Waste Framework Directive). It serves as basis of the comparison of the impacts of the measures that are part of scenarios 1 and 2.

Presently the European list of waste comprises 839 waste codes. 405 codes are codes for hazardous wastes and 131 codes are mirror entries.

The coding of the waste keys is done via a six digit decimal classification (XX YY ZZ).

XX	main section 1 to 20, provides general information about the group of wastes (e.g. group with a same origin),
YY	subsection, provides more detailed information about the subgroup of wastes,
ZZ	consecutive number for each waste type[3].

The LoW is structured by 20 sections ("**XX**"). The header of section 1 to 12 and 17 to 19 refers to industry sectors and/or processes. The headers of sections 13 to 15 are referring to materials and section 16, which is largely material based as well, is reserved for wastes not otherwise mentioned. Section 20 covers municipal wastes and similar commercial, industrial and institutional waste.

The analysis from the year 2006 [Ökopol 2006] gave the following overview of the different criteria of the main headers on the LoW.

[3] The fact that numbers are missing on the ZZ-level results from the last review of the waste list where it was decided to give new and amended waste types new codes which have not been part of the previous version and to keep deleted codes unused. This was done in order to avoid confusion in the transitional phase between old and amended waste list

Table 1: Structuring elements of the LoW (main header)

Section	Sector	Process	Main component	Type of waste
1		X		
2	X	X		
3		X		
4	X			
5		X		
6		X		
7		X		
8		X		
9	X			
10		X		
11		X		
12		X		
13			X	
14			X	
15			X	
16				X
17		X		
18		X		
19		X		
20	X			

The number of subsections (“**YY**”) differs. Section 9 for example comprises just one subsection while section 10 has 14 subsections. Most of the subsections also include entries for wastes which can not be assigned to other entries (where “ZZ” is “99” “Wastes not otherwise specified”).

Within the entries itself (“**ZZ**”) a wide variety of types of descriptions of the waste can be found that uses different descriptors for the characterisation of wastes. The entries include:

- 66 entries providing exclusively information about the origin,
- 260 waste codes that give information about the process where the waste has been generated,
- 245 waste codes that give information about the physical state of the waste and
- 514 waste codes that give information about the material or substance present in the waste as main component.

The table below shows some examples for the diverging use of descriptors.

Table 2: Example for descriptors in the entries of the LoW

Descriptor	Example of the entry	
	Full name	**Code**
origin	➢ waste from forestry ➢ waste otherwise not specified	020107 XXYY99
process	➢ wastes from cooling-water treatment ➢ wastes from solvent extraction	100126 020303
material	➢ plastic ➢ solvents	170203 200113*
substances	➢ components containing PCBs ➢ wastes containing mercury	160109* 050701*
product groups	➢ end of life vehicles, containing neither liquids nor other hazardous components ➢ batteries and accumulators other than those mentioned in 20 01 33	160106 200134
consistency	➢ solid wastes containing dangerous substances ➢ aqueous liquid wastes	070413* 191103*
function	➢ absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances ➢ insulation materials containing asbestos	150202* 170601*
nature	➢ sharps (except 180103) ➢ other waste explosives	180101 160403*
handling	➢ wastes whose collection and disposal is subject to special requirements in order to prevent infection	180202*
haz (*).- non hazardous	➢ solid salts and solutions containing heavy metals ➢ solid salts and solutions other than those mentioned in 06 03 11 and 06 03 13	060313* 060314
Codes with mixed criteria	➢ sludge containing dangerous substances from other treatment of industrial waste water ➢ construction and demolition wastes containing PCB (for example PCB containing sealants, PCB-containing resin-based floorings, PCB-containing sealed glazing units, PCB-containing capacitors) ➢ metallic packaging containing a dangerous solid porous matrix (for example asbestos), including empty pressure containers	190813* 170902* 150111*

In the baseline scenario new entries are taken up in the list in the future as part of the routine of further developing the list (as required by Article 7(2) of the revised WFD). Those entries result from input of stakeholders and from monitoring and control requirements of waste directives (like the WEEE Directive). The new entries are added with six digit codes to the list.

In the course of the survey more around 300 new entries have been proposed by the stakeholders (see volume 1 of this study).

According to Article 3 of the List of Waste Member States may reclassify wastes of the LoW and communicate those reclassifications to the Commission on a yearly basis.

The Netherlands and Germany have made use of this possibility and notified in total seven waste codes for wastes generated in eight plants. Most of them have been reclassification from hazardous to non-hazardous wastes (details are shown in table below).

In addition to those single case notifications more structural remarks regarding some waste codes were also made. The Czech Republic requested the right to generally reclassify the waste codes 180109, 180208, 200132[4] from non-hazardous to hazardous as a precautionary measure. According to them most of the expired medical substances exceed the concentrations limits that render the waste hazardous and it is not possible to make a sound distinction between those medicaments exceeding the concentration limits and those not exceeding them. The Netherlands requested to add a unique code for spent activated carbon from waste water treatment plants in subchapter 1908. Until now the waste codes 150202*[5] and 190899[6] have been used simultaneously in order to address the source <u>and</u> the nature of the waste.

[4] medicines other than those mentioned in 180108/180208/200132

[5] absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances

[6] wastes not otherwise specified

Table 3: Member States Notification according to Article 3 of the LoW

MS	Germany	Germany	Germany	Germany	Germany	Germany	Netherlands
year of notification	2005	2004 & 2006	2006	2006	2006	2004	2005
Waste code	10 01 02	190805	071004*	190107*	70501*	110116*	190106*
Description LoW	Coal fly ash	Sludges from treatment of urban waste water	other organic solvents, washing liquids and mother liquors	solid wastes from gas treatment	aqueous washing liquids and mother liquors	saturated or spent ion exchange resins	aqueous liquid wastes from gas treatment and other aqueous liquid wastes
Plant type	Coal power plant	Regional waste water plants	biodiesel production plant	waste incineration plant	MFSU of pharmaceuticals	Not specified	Desulphurisation installation
Reclassification from	Non-hazardous	Non-hazardous	Hazardous	Hazardous	Hazardous	Hazardous	Hazardous
to	Hazardous	Hazardous	Non-hazardous	Non-hazardous	Non-hazardous	Non-hazardous	Non-hazardous
Hazardous substance in question	Arsenic (As_2O_3)	Heavy metals	Glycerin, Methanol	Various Heavy metals, PCDD/F	not specified	Cyanides	Magnesium sulfate
No. of plants affected	1	2	1	1	1	1	1
Reason for reclassification	Concentration limits for H6 exceed	concentrations above 2500mg/kg, R 50, R 53 → H 14	no relevant pollution found, Methanol below concentration limits of ≥ 3%	no relevant pollution found	content below concentration limits	no relevant pollution found[7]	concentration limits are below the ones indicated in Article 4 of the LoW
Analyses attached to notification	No	No	No	No[8]	No	No	Yes

[7] due to in-house recycling of waste water and recovery of gold from resins elsewhere

[8] Certain requirements are associated with this reclassification: The waste has to be controlled and the flue gas treatment and other installation parts are not to be changed in a way so the waste contains more pollutants due to the changes

Scenario 1 System of independent descriptors

Main elements of the scenario

The system of "Independent Descriptors" (ID) was developed by the Flemish OVAM[9]. It describes the characteristics of a waste by a number of descriptors, which can be combined individually.

The original approach comprised a number of descriptors which are, inter alia:

- "origin"; The origin and the process/activity where the waste is generated is described by the national implementation of the NACE code (NACEBEL) extended with two hierarchical levels.
- "nature" (e.g. fixer, fireworks, catalysts), "Waste named according to its function in a former life (including off-specs which in fact had no "former life"), waste classified according to its biotic origin, a category for "other waste" and finally a category with waste described on the basis of their chemical nature an composition. To avoid double coding, the table must run from top to bottom, so that e.g. no code classified according to chemical nature can be used if an applicable code already exists in one of the previous categories, for instance in the codes according to former life" [OVAM 2000 Matrix manual].
- "main component" (e.g.. chlorine, mercury, aluminium, plastic), This descriptor indicates the most characteristic component, that specifies in greater detail the nature of the waste described by the descriptor "nature" like "packaging waste" as nature and "plastic" as main component.
- "polluting component" (e.g. wood hardening agent, coating, pigment, PCDD/F), Where a code appears both as descriptor "main component" and as descriptor "polluting component", it is always opted to use the same number.
- "physical state" (e.g. gas, liquid, sludge),
- "hazard" (H-criteria according to the Hazardous Waste Directive),
- "collection and removal method" (e.g. Removal upon request, Collection points, Recycling centres),
- "treatment / processing" (e.g. recycling),
- "geographical origin"; "For the sake of spatial analysis, and the management of data on the import and export of waste, a table was added with country and region codes." [OVAM 2000 Matrix manual]

The choice of descriptors depends on the objective, the addressees and the context of the system[10].

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9 Flemish Public Waste Agency.

10 E.g. whether information about the constituents of the waste will be communicated via additional instruments/documents like the waste data sheets documents for hazardous waste.

The individual descriptors could go into great detail and with this every waste situation can be recorded in detail without loss of information. However, there is no compulsory detail level. Where knowledge about a waste is not detailed a description of the waste with fewer elements can be used, if details about the waste are known it is possible to use more details in the encoding process. The degree of detail is a matter of policy, and is not forced by the system of independent descriptors.

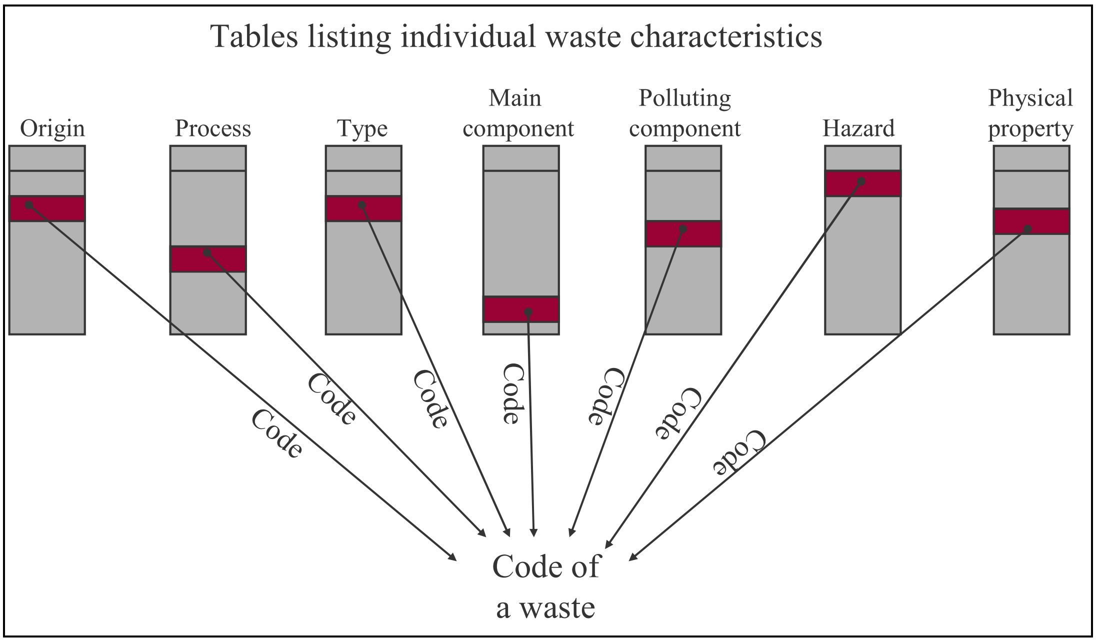

Figure 5: Illustration of the generation of waste codes in the ID-system

An advantage of such an approach compared to a hierarchical system (tree structure) is that a tree structure must take all possible waste situations into account in the list. The full set of elements of the lower hierarchical levels must be repeated for each element of a higher level. This leads in practice to a long list with limited usability. If certain elements are left out (e.g. because they are seen as not often applicable) in order to minimise the length of the list it will become unsystematic, less transparent and only applicable for some cases when generic entries are added.

A comprehensive set of tables for the description of waste characteristics is provided in vol.4 Annex 24 of this report.

According to OVAM 2006[11] and OVAM 2008[12] several of the objectives of the approach can also be achieved with a system of three independent descriptors: “Origin”, “Nature / material” and “Hazard” where the descriptor “hazard” is a “Yes/No” descriptor.

[11] Pers.com OVAM, Member State workshops, September 2005, Hamburg

[12] Pers.com. OVAM August 2008

Impacts

The system of independent descriptors (ID) is a very transparent and comprehensive way to encode and decode waste properties. This potentially leads to a reduction of questionable or wrong assignments of wastes to codes.

The functioning of the waste codes as a common terminology in the waste management chains is improved since the waste code can describe the waste in more detail and the encoded information describes the waste properties more individually compared to the present system. This supports that the decoding of a waste code by a recycling company leads to congruency of information used by the waste producer for encoding.

The improved communication function enables improved management of risks of the waste along the waste treatment chain.

A system of independent descriptors can lead at the same time to an improved communication of the resource content of a waste, when the descriptors are extended regarding further resource management aspects.

Permits regarding the use of waste in an installation can be more focussed on parameters which are decisive for an environmentally sound operation of the process by referring to individual descriptors instead of setting a list of allowed waste codes (which is often very long, sometimes with a “pooling” of all available waste codes which eventually become relevant and often not transparent regarding the decisive parameters[13]).

The encoded information about the waste remains available after a pre-treatment of the waste in a waste management installation. While in the present system the waste gets a fully new code (from section 19 of the LoW) only some elements of the codes are changed in the ID system (e.g. the part that describes the polluting component) and the description of the origin is extended by a descriptor of the waste management type.

Extending the list by adding new entries similar to what is part of the baseline scenario is not necessary to the same extent as for the present list due to the possibility of free combination of identifiers. If necessary extensions can be applied per descriptor (per “table”).

The systematic structure and the systematic content of the ID-system lead to high transparency of the waste encoding process and with this to improved usability and to improved certainty in the decoding process.

It is expected that classification of hazardous waste and the overall characterisation process in such a revised system can follow similar routines as it is the case in the present system (e.g. identify the information for the different identifiers from existing knowledge about the waste) and the steps described in the generic characterisation approach in volume 2 of this report can be applied in a similar way. However, the ID-system asks for more information about the waste in order to find an appropriate identifier in each table that will be used to

[13] e.g. regarding the parameter „chlorine content“ in mixed waste for energy recovery

describe the waste[14]. This leads to more precise description of the waste by its waste codes and thus to improved risk management measures.

Efforts for the encoding of waste properties by the waste producer are in many cases increased in such a system. At the same time the decoding is supported in a better way. In an overall view encoding and decoding are more balanced than in the present LoW, where the structure of the list and the type of the waste codes are very much focussed on the expectations of waste producers (see also p.5 ff of this report).

The individual table of the ID-system are shorter than the existing LoW. But at the same time more than one “list” (table) has to be considered. The code itself becomes more complex and requires more syntax.

Waste producers, waste management companies and authorities must adapt their data processing system to the needs of the new structure of the list when the ID-system is introduced. National reporting systems and notification procedures for transboundary shipment of waste must be adapted. Administrative and financial efforts for doing so differ with the size of the waste generating or waste management company, whether the wastes are one-off wastes or recurring wastes and whether the authority permits and controls installations or whether it monitors and controls waste flows.

The following list differentiates the administrative efforts from the change to an ID-system per stakeholder type. For details about the stakeholder types see vol.3 chapter 3 of this report.

a) Small waste producer: For one-off wastes change from old to new LoW will not have high impacts. Time and efforts for finding appropriate waste codes in a new LoW is expected to be slightly higher than in the old LoW[15].

b) Large waste producers: The interface between internal codes and external waste codes is usually done by a kind of “translation table”. This table must be re-designed (one of impact). The more precise/differentiated description of waste properties in the new system might result in higher numbers of (external) waste codes.

c) Small waste management companies: The more precise/ differentiated description of the wastes via the new waste codes will improve reliability of decoding and availability of differentiated information about the waste and supports conduct of business (continuous impact).

d) Large waste management companies: As for large waste producers the interface between internal and external codes must be re-designed (one-off impact). As for small waste management companies the more precise/differentiated description supports conduct of business (continuous impact). The magnitude of this advantage is smaller than for small waste management companies because large waste management companies often have an own sophisticated system for the description and communication of waste properties.

[14] I t is noted that not each identifier must be applied for each waste.

[15] For recurring wastes additional time would be necessary for identifying the new codes compared to the use of the old codes. This is a one off impact.

e) Authorities that permit and control installations. The permits must be adapted to the new waste codes (one off impact). Available information about wastes that are used in the installation will be improved because of amended encoding and decoding (continuous impact).

f) Authorities that monitor and control waste flows (including transboundary waste flows). Monitoring of waste streams can be improved by an ID-system and better cover wastes that result from the treatment of a monitored waste (in the present LoW monitoring of wastes along the waste treatment chain is often not possible because the wastes get new and often very general waste codes when leaving a waste treatment installation) (continuous impact). The new waste codes will result in discontinuity of waste statistics (one off impacts).

The use of the ID-system can be simplified by applying it as a computerised system. In contrast to the present LoW the systematic and transparent character of the ID-system is very close to the needs of a computerised system.

The following table summarises the results from the analysis of the ID-system according to the set of criteria developed in chapter 3 of this report.

Table 4: Summary of assessment results regarding environmental impacts (TOR criteria)

Criterion	As-sessment	Explanation
Does the measure support an easy/simplified classification of wastes with regard to their environmental properties and hazardousness?	+	The assignment process is systematic and transparent and congruency of encoding and decoding is supported in a better way than in the present LoW. More comprehensive description of the waste properties
Does the measure support the assessment of environmental impacts arising from the waste in the context of its impacts during its whole life cycle?	+	Information about the properties of the waste do not get lost when the waste is treated in a waste treatment plant
Does the measure support that an efficient waste management is ensured or can be achieved (includes inter alia steering of wastes and the achievement of environmental objectives)?	+	The system comprises the possibility to include information about subsequent waste management activities Information about the origin of the waste can be communicated even when the waste has undergone treatment in a waste management installation,
Does the measure contribute to transparency and improved monitoring of waste streams for control purposes?	+	Information about the origin of the waste can be transported even when the waste has undergone treatment in a waste management installation; Information about origin can be transported independently from other code; the present system combines properties and origin, The amount of waste disposed off under unspecific entries (like the "99"-entries of the present list) will be reduced
Does the measure support the verification of the effectiveness of European regulations with regard to specific waste streams?	+	The ID-system and the degree of differentiation in the system allows evaluation of information in line with the monitoring needs. Where certain descriptors are missing they can be added to the system more easily than in the present LoW.
Does the measure affect the installation permits with regard to an environmentally sound applicability of wastes in the respective process?	+	A more detailed description of the waste can be achieved which can comprises more details relevant for the process Installation permits can refer more easily to specific waste properties (e.g. limitations are related to specific descriptors)
Does the measure support the functioning as basis for waste statistics regarding, generation, treatment, recovery and final disposal of waste aiming at delivering statistical information for policy makers and industry association (policy performance -closely linked to the efficiency of waste management)?	+	C loser relation to waste statistics results from the use of the origin of the waste as independent descriptor Analysis of the development of waste amounts and waste management activities is possible per property that is encoded in a table No discontinuity of waste statistics as it is the case for present list when entries are amended, deleted, or when new entries are introduced The amount of waste disposed off under unspecific entries (like the "99"-entries of the present list) will be reduced
Does the measure affect existing and implemented waste management legislation in the Member States?	+/ --	-- requires changes waste codes + improved monitoring and reporting capabilities in the context of waste Directives like WEEE, ELV-, Packaging- and Batteries Directive
Does the measure affect other Community waste legislation, for instance the Waste Shipment Regulation (EC) No 253/93?	+/0	+ improved monitoring and reporting capabilities by more differentiated description of waste 0 no change of WSR required
Does the measure provide for flexibility to detail the codes agreed on the EU level by country specific (sub) entries?	0	(National) sub-codes are not intended in the ID-system. However, ID-system supersedes the need for (national) sub-codes.

Scenario 2 Adapted LoW

This scenario aims at achieving the objectives of the review of the LoW by moderate amendments of the structure and the entries. It groups a number of individual measures to improve the functioning of the LoW:

Measure 1a: "Waste origin" as an independent descriptor

In the LoW a number of similar waste types are mentioned repeatedly in several sections. The only difference is the origin of the waste. Because of the fact that the "origin" is a structuring element of the LoW the waste type must be repeatedly mentioned in each appropriate section of the LoW.

Measure 1a aims at making the description of the origin more systematic and reduce the number of entries of the LoW by avoiding repetitions. Therefore the description of the origin of the waste is separated from the remaining waste code.

Present list:

Code	Text
07 01 11*	sludges from on-site effluent treatment containing dangerous substances
07 02 11*	sludges from on-site effluent treatment containing dangerous substances
07 03 11*	sludges from on-site effluent treatment containing dangerous substances
07 04 11*	sludges from on-site effluent treatment containing dangerous substances
07 05 11*	sludges from on-site effluent treatment containing dangerous substances
07 06 11*	sludges from on-site effluent treatment containing dangerous substances
07 07 11*	sludges from on-site effluent treatment containing dangerous substances

Revised list:

Description of origin	Description of waste type	
New code part 1	New code part 2	Text
Code for origin	Code for waste type	sludges from on-site effluent treatment containing dangerous substances

Figure 6: Illustration of a revised structure of the LoW

Some sections of the LoW are material orientated (121 entries = 14%) and specific approaches have to be found for those sections (see below). Those sections are:

- 13 OIL WASTES AND WASTES OF LIQUID FUELS
- 14 WASTE ORGANIC SOLVENTS, REFRIGERANTS AND PROPELLANTS
- 15 WASTE PACKAGING; ABSORBENTS, WIPING CLOTHS, FILTER MATERIALS AND PROTECTIVE CLOTHING NOT OTHERWISE SPECIFIED
- 16 WASTES NOT OTHERWISE SPECIFIED IN THE LIST

Section 17 (CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)) has a mixed structure because "Construction of buildings" and "Demolition of buildings" can be handled as economic activity (origin) but "excavated soil" does not include a description of the origin.

Sub-sections of section 06, 07 and 08 describe a very broad range of origins. Here especially the term "use" of substances and/or articles in the entries covering the "MANUFACTURE, FORMULATION, SUPPLY AND USE (MFSU)" requires special attention when the origin shall be described by an isolated descriptor.

06	01	wastes from the MFSU of acids
06	02	wastes from the MFSU of bases
06	03	wastes from the MFSU of salts and their solutions and metallic oxides
06	06	wastes from the MFSU of sulphur chemicals, sulphur chemical processes and desulphurisation processes
06	07	wastes from the MFSU of halogens and halogen chemical processes
06	08	wastes from the MFSU of silicon and silicon derivatives
06	09	wastes from the MSFU of phosphorous chemicals and phosphorous chemical processes
06	10	wastes from the MFSU of nitrogen chemicals, nitrogen chemical processes and fertiliser manufacture
07	01	wastes from the MFSU of basic organic chemicals
07	02	wastes from the MFSU of plastics, synthetic rubber and man-made fibres
07	03	wastes from the MFSU of organic dyes and pigments
07	04	wastes from the MFSU of organic plant protection products, wood preserving agents and other biocides
07	05	wastes from the MFSU of pharmaceuticals
07	06	wastes from the MFSU of fats, grease, soaps, detergents, disinfectants and cosmetics
07	07	wastes from the MFSU of fine chemicals and chemical products not otherwise specified
08	01	wastes from the MFSU and removal of paint and varnish
08	02	wastes from the MFSU of other coatings (including ceramic materials)
08	03	wastes from the MFSU of printing inks
08	04	wastes from the MFSU of adhesives and sealants (including waterproofing products)

Stakeholders expressed concerns about the term "use" in those entries because this covers an extremely broad field of applications and does not help adequately for the qualification of waste characteristics. It might also conflict with other sections of the list (e.g. when hydrochloric acid is use in galvanising industry).

NACE code

One option within this measure is to describe the origin of the waste by the NACE code of the economic activity.

The NACE code describes economic activities in

- 21 Sections (indicated with a letter)
- 88 Divisions (indicated with 2 digits)
- 272 Groups (indicated with 3 digits)
- 615 Classes (indicated with 4 digits)

The following tables show exemplary section of the system of NACE codes.

Table 5: List of heading of NACE sections (NACE rev.2)

CODE	EN_DESCRIPTION
A	AGRICULTURE, FORESTRY AND FISHING
B	MINING AND QUARRYING
C	MANUFACTURING
D	ELECTRICITY, GAS, STEAM AND AIR CONDITIONING SUPPLY
E	WATER SUPPLY; SEWERAGE, WASTE MANAGEMENT AND REMEDIATION ACTIVITIES
F	CONSTRUCTION
G	WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES AND MOTORCYCLES
H	TRANSPORTATION AND STORAGE
I	ACCOMMODATION AND FOOD SERVICE ACTIVITIES
J	INFORMATION AND COMMUNICATION
K	FINANCIAL AND INSURANCE ACTIVITIES
L	REAL ESTATE ACTIVITIES
M	PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES
N	ADMINISTRATIVE AND SUPPORT SERVICE ACTIVITIES
O	PUBLIC ADMINISTRATION AND DEFENCE; COMPULSORY SOCIAL SECURITY
P	EDUCATION
Q	HUMAN HEALTH AND SOCIAL WORK ACTIVITIES
R	ARTS, ENTERTAINMENT AND RECREATION
S	OTHER SERVICE ACTIVITIES
T	ACTIVITIES OF HOUSEHOLDS AS EMPLOYERS; UNDIFFERENTIATED GOODS- AND SERVICES-PRODUCING ACTIVITIES OF HOUSEHOLDS FOR OWN USE
U	ACTIVITIES OF EXTRATERRITORIAL ORGANISATIONS AND BODIES

As an exemplary case the elements of section C “Manufacturing” are shown in the table below.

Table 6: Exemplary list of NACE divisions (NACE rev.2)

CODE	EN_DESCRIPTION
C	MANUFACTURING
10	Manufacture of food products
11	Manufacture of beverages
12	Manufacture of tobacco products
13	Manufacture of textiles
14	Manufacture of wearing apparel
15	Manufacture of leather and related products
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
17	Manufacture of paper and paper products
18	Printing and reproduction of recorded media
19	Manufacture of coke and refined petroleum products
20	Manufacture of chemicals and chemical products
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
22	Manufacture of rubber and plastic products
23	Manufacture of other non-metallic mineral products
24	Manufacture of basic metals
25	Manufacture of fabricated metal products, except machinery and equipment
26	Manufacture of computer, electronic and optical products
27	Manufacture of electrical equipment
28	Manufacture of machinery and equipment n.e.c.
29	Manufacture of motor vehicles, trailers and semi-trailers
30	Manufacture of other transport equipment
31	Manufacture of furniture
32	Other manufacturing
33	Repair and installation of machinery and equipment

The further differentiation of the codes is illustrated by the example of section 20 “Manufacture of chemicals and chemical products” in the table below.

Table 7: Exemplary list of NACE groups and classes (NACE rev.2)

CODE	EN_DESCRIPTION
20	Manufacture of chemicals and chemical products
20.1	Manufacture of basic chemicals, fertilisers and nitrogen compounds, plastics and synthetic rubber in primary forms
20.11	Manufacture of industrial gases
20.12	Manufacture of dyes and pigments
20.13	Manufacture of other inorganic basic chemicals
20.14	Manufacture of other organic basic chemicals
20.15	Manufacture of fertilisers and nitrogen compounds
20.16	Manufacture of plastics in primary forms
20.17	Manufacture of synthetic rubber in primary forms
20.2	Manufacture of pesticides and other agrochemical products
20.20	Manufacture of pesticides and other agrochemical products
20.3	Manufacture of paints, varnishes and similar coatings, printing ink and mastics
20.30	Manufacture of paints, varnishes and similar coatings, printing ink and mastics
20.4	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations
20.41	Manufacture of soap and detergents, cleaning and polishing preparations
20.42	Manufacture of perfumes and toilet preparations
20.5	Manufacture of other chemical products
20.51	Manufacture of explosives
20.52	Manufacture of glues
20.53	Manufacture of essential oils
20.59	Manufacture of other chemical products n.e.c.
20.6	Manufacture of man-made fibres
20.60	Manufacture of man-made fibres

The following table compares the description of the origin in the present LoW and via the NACE codes. Issues with the description of the origin of a waste by NACE codes are highlighted and options to overcome these issues are presented.

Table 8: Analysis of applicability of NACE codes as descriptors for the origin of wastes (NACE rev.2)

LoW entry	NACE code	Example (LoW code NACE code)	Impact	Quantification	Option	Impact of option
Describes an economic activity independent from the local unit	NACE code is usually on the level of a local unit of the economic activity; s	Example of a car manufacturer where ferrous metals are mechanically treated LoW code for the waste refers to "mechanical treatment of metals (12.01). NACE code for the local unit of the economic activity is 29.10 "Manufacture of motor vehicles"	The level of the enterprise (= local economic activity) is less detailed than the description of the origin in the waste code	Several	Include description of origin in the text of the entry (status quo)	Number of entries can not be reduced to the extend as it would be the case when the origin could be completely described by independent identifiers
Describes a waste generating technical process	Describes an economic activity with more than one waste generating processes	LoW code: 010304* acid-generating tailings from processing of sulphide ore NACE code 24.44 Copper production	NACE code provides less information about origin	Numerous	Only description of the economic activity is done via NACE code. The waste generating process remains part of the waste code text	Number of entries can not be reduced to the extend as it would be the case if the origin could be completely described by independent identifiers
Comprises more than one economic activity	More than one NACE code per LoW entry, often numerous	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 dangerous substances 20, 43, 13, 16, 17, 18, 22, 23, 25, etc.	NACE code provides more detailed information about origin	Numerous, E.g. all sections of the LoW with MFSU of substances and preparations; in general: all entries that describe substance or preparation and where the heading does not restrict the entries to a certain process origin	No action necessary because positive impact of more detailed description of the origin is achieved without negative impact (e.g. administrative efforts) because the NACE code is known to the companies	Accuracy of information about the waste increases

Other descriptors

In this second option within this measure the existing descriptions of the origins in the LoW are used as far as possible as basis for the development of independent descriptors.

A general distinction is made in a first step between waste from commercial processes (Manufacturing/formulation of substances, mixtures and articles) and end of service life articles. **"Commercial processes"** mainly covers sections 1 to 12 of the present LoW. Availability of information about waste characteristics will be influenced for a number of wastes in this section from the REACh information and communication requirements (see the chapter about REACh in vol.2 of this report). **End-of-service-life-articles** are wastes that are not directly generated in commercial production processes. They can occur from economic activities and in private households (e.g. packaging).

With this general differentiation the identification of the appropriate entry will be simplified for the waste producer in the assignment process.

The following list illustrates the three levels of origin. Text and code have been maintained as far as possible in order to minimise efforts for the change of systems. The new level 1 would result in a general change of the code. In order to keep the proposal in this scenario as close as possible to the present structure of the LoW Level 1 and Level 2 can be combined in a way that it is fixed that entries 1 to 12 are entries for waste from commercial processes and 13 to 20 are entries for end-of-service-life-articles.

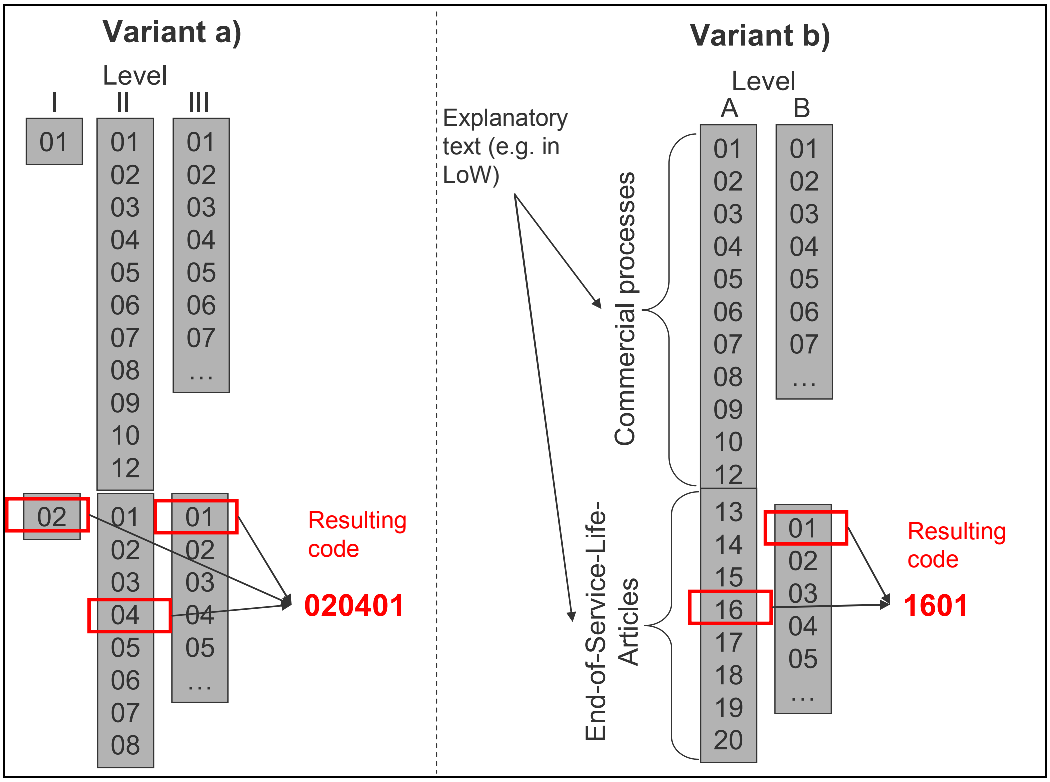

Figure 7: Variants of the description of the origin

The advantage of variant a) is that it is easier for the user to find the appropriate code because he does not need to refer to guiding text where the codes for "End-of-Service-Life-Articles" start. The advantage of variant b) is that the codes that describes the origin of the waste is very close to the code of the present LoW with its a 4-digit code for the description of the origin.

The origin ""MANUFACTURE, FORMULATION, SUPPLY AND USE (MFSU) of …" has been amended by deleting the term "use" in order to provide a more precise description of the origin.

The term "waste from …" has been deleted in the description of the origin.

Please note that the following lists are exemplary illustrations for the outline of a concept where the code for the origin is detached from the remaining code.

Table 9: List of origins (exemplary description)

Origin level 1

01	WASTE FROM COMMERCIAL PROCESSES (MANUFACTURING/FORMULATION OF SUBSTANCES, MIXTURES AND ARTICLES)
02	END OF SERVICE LIFE ARTICLES

Origin Level 2

01	01	exploration, mining, quarrying, and physical and chemical treatment of minerals
01	02	agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing
01	03	wood processing and the production of panels and furniture, pulp, paper and cardboard
01	04	leather, fur and textile industries
01	05	petroleum refining, natural gas purification and pyrolytic treatment of coal
01	06	inorganic chemical processes
01	07	organic chemical processes
01	09	thermal processes
01	10	chemical surface treatment and coating and hydro-metallurgy
01	11	human or animal health care and/or related research (except kitchen and restaurant wastes not arising from immediate health care)
01	12	construction activities

Origin level 3

01	01	01	mineral excavation
01	01	02	coal and lignite excavation
01	01	03	physical and chemical processing of metalliferous minerals
01	01	04	physical and chemical processing of non-metalliferous minerals
01	01	05	other
01	02	01	agriculture, horticulture, aquaculture, forestry, hunting and fishing
01	02	02	preparation and processing of meat, fish and other foods of animal origin
01	02	03	fruit, vegetables, cereals, edible oils, cocoa, coffee, tea and tobacco preparation and processing; conserve production; yeast and yeast extract production, molasses preparation and fermentation
01	02	04	sugar processing
01	02	05	dairy products industry
01	02	06	baking and confectionery industry
01	02	07	production of alcoholic and non-alcoholic beverages (except coffee, tea and cocoa)
01	03	01	wood processing and the production of panels and furniture
01	03	02	wood preservation
01	03	03	pulp, paper and cardboard production and processing
01	03	04	production and/ or processing of plastic laminate and decorative panels
01	04	01	leather and fur industry
01	04	02	textile industry
01	05	01	petroleum refining
01	05	02	pyrolytic treatment of coal
01	05	03	natural gas purification and transportation
01	06	01	MFS of inorganic acids
01	06	02	MFS of inorganic bases
01	06	03	MFS of salts and their solutions and metallic oxides
01	06	05	MFS of sulphur chemicals, sulphur chemical processes and desulphurisation processes
01	06	06	MFS of halogens and halogen chemical processes
01	06	07	MFS of silicon and silicon derivatives
01	06	08	MFS of phosphorous chemicals
01	06	09	MFS of nitrogen chemicals and fertiliser
01	06	10	manufacture of inorganic pigments and opacificiers

The individual waste types are linked to the origin level 3. The figure below illustrates this for thermal processes (01 09). Non-specific entries are not shown (e.g. waste from off gas treatment) because they are grouped in other sections of the list.

Origin I	Origin II	Origin III	Waste types that are linked to the origins
Commercial activities	thermal processes	power stations and other combustion plants (except XYZ)	wastes from fuel storage and preparation of coal-fired power plants
			wastes from fuel storage and preparation of oil shale-fired power plants
		iron and steel thermal metallurgy	wastes from the processing of slag
			mill scales
		aluminium thermal metallurgy	anode scraps
			waste alumina
			salt slags from secondary production
			black drosses from secondary production
			skimmings that are flammable or emit, upon contact with water, flammable gases in dangerous quantities
			skimmings other than those mentioned in ?
			tar-containing wastes from anode manufacture
			carbon-containing wastes from anode manufacture other than ?
			other particulates and dust (including ball-mill dust) containing dangerous substances
			other particulates and dust (including ball-mill dust) other than ?
			wastes from treatment of salt slags and black drosses containing dangerous substances
			wastes from treatment of salt slags and black drosses other than ?
		lead thermal metallurgy	dross and skimmings from primary and secondary production
			calcium arsenate
			particulates and dust other than flue gas dust
		zinc thermal metallurgy	dross and skimmings that are flammable or emit, upon contact with water, flammable gases in dangerous quantities
			dross and skimmings other than ?
		copper thermal metallurgy	dross and skimmings from primary and secondary production
			particulates and dust other than flue gas dust
		silver, gold, platinum thermal metallurgy	dross and skimmings from primary and secondary production
			particulates and dust other than flue gas dust and particulate from flue gas cleaning

In this scenario each waste is linked with an origin even in those cases where the present LoW does not indicate an origin of the waste (sections 13 to 16 and partly 17). Since the revised LoW is intended to be an electronic document which can be filtered and sorted according to the needs of the users this does not lead to a longer list as it would be the case for the present list.

The origin of the waste could be described in such a system partly by NACE codes (e.g. level 2 of the description of the origin might be done by NACE codes). This could ease to link the LoW and the European waste statistics. However, for this the descriptions of the origin on level 2 must be tailored to the NACE system and the level-3-origins must be newly assigned. The result would be a description of the origin which is again very close to the NACE system.

The alternative to further link the LoW and the European statistical system by a kind of translation table is preferred for this scenario in order to minimise changes of the LoW as far as possible. In contrast to the NACE code and to scenario 1 it is not intended here to provide a full list of every possible origin which is systematic on all levels. Only those origins are reflected which are actually needed in the LoW. The proceeding for the development of a list of origins shall be to analyse each entry of the LoW (including the stakeholders' proposals for new and deleted entries), extract each mentioned origin and assign it to one of the three levels of the new description of the origin.

It is obvious that not every origin can be combined with every waste type in every waste category. The origins are only linked with waste types that actually can result from that origin and vice versa (see illustrations below). Only those origins are used that are presently in the List of Waste.

iron and steel industry	02	01	wastes from the processing of slag
	02	02	unprocessed slag
	02	07	solid wastes from gas treatment containing dangerous substances
	02	08	solid wastes from gas treatment other than those mentioned in 02 07
	02	10	mill scales
	02	11	wastes from cooling-water treatment containing oil
	02	12	wastes from cooling-water treatment other than those mentioned in 02 11
	02	13	sludges and filter cakes from gas treatment containing dangerous substances
	02	14	sludges and filter cakes from gas treatment other than those mentioned in 02 13
	02	15	other sludges and filter cakes
	02	99	wastes not otherwise specified

Figure 8: Illustration for the link between origin and waste types

Figure 9: Illustration for the link between waste type and origins

Measure 1a shall be combined with Measure 1c: Electronic processing of the LoW in order to enable comfortable search of appropriate entries, individual sorting of the list and enable an appearance of the list which is as close as possible to the present list if wanted (see vol.3 chapter 0 of this report).

Concluding it can be stated that the NACE system is not designed in a way that it fully fits for the needs of a communication instrument that shall trigger risk management and other waste management measures. It is proposed to describe the origin of the waste in this scenario by a system that describes the origin of a waste by three levels and which takes up only those origins that are in the LoW (after taking up stakeholders' proposals for new and deleted entries).

Measure 1b: Structure of the remaining code

In conjunction with measure 1a the remaining code of the entries is to be reviewed. The TOR refers to Annex VIII and IX of the Basel Convention as one possible variant for a material orientated list.

A material based structure of the remaining waste code aims at providing a homogeneous structuring criterion of the list that complements the origin based first part of the code and enables improved encoding of properties of the waste and thus improved achievement of the environmental objectives of the LoW.

Option: Basel list

A material oriented list is the waste list of the Basel Convention. Actually the Basel Convention contains two waste lists. The wastes listed in Annex VIII are considered to be hazardous unless they do not possess any of the characteristics contained in Annex III of the Convention, which is a list of 14 “hazardous characteristics”. Waste listed in Annex IX is not considered to b hazardous unless they contain Annex I material to an extent causing them to exhibit an Annex III characteristic. The lists are material oriented.

In total the Basel list (Annex VIII and IX) comprises eight sections with 120 entries. While all headers of the sections are material oriented the picture of the individual entries is multifaceted:

- 102 entries contain information about materials/substances (constituents and contaminants) and partly complex (end of live) products,
- 14 about the physical state (e.g. sludge, dust, solution),
- 36 contain information about origin processes (e.g. waste from electrolyte purification processes) and
- 14 entries contain information about the origin sectors (e.g. chemical industry).

Some entries are more general and some entries are very specific (e.g. “Wastes that contain, consist of or are contaminated with leaded anti-knock compound sludges”, or “Used single-use cameras, with batteries not included on list A”).

The following table provide some exemplary entries from Annex VIII and Annex IX to the Basel Convention.

Table 10: Annex VIII of the Basel Convention (Hazardous Wastes) (Example of section A1 Metal and metal-bearing wastes)

A1010	Metal wastes and waste consisting of alloys of any of the following: Antimony, Arsenic, Beryllium, Cadmium, Lead, Mercury, Selenium, Tellurium, Thallium, but excluding such wastes specifically listed on list B.
A1020	Waste having as constituents or contaminants, excluding metal waste in massive form, any of the following: Antimony; antimony compounds, Beryllium; beryllium compounds, Cadmium; cadmium compounds, Lead; lead compounds, Selenium; selenium compounds, Tellurium; tellurium compounds
A1030	Wastes having as constituents or contaminants any of the following: Arsenic; arsenic compounds, Mercury; mercury compounds, Thallium; thallium compounds
A1040	Wastes having as constituents any of the following: Metal carbonyls, Hexavalent chromium compounds
A1050	Galvanic sludges
A1060	Waste liquors from the pickling of metals
A1070	Leaching residues from zinc processing, dust and sludges such as jarosite, hematite, etc.
A1080	Waste zinc residues not included on list B, containing lead and cadmium in concentrations sufficient to exhibit Annex III characteristics
A1090	Ashes from the incineration of insulated copper wire
A1100	Dusts and residues from gas cleaning systems of copper smelters
A1110	Spent electrolytic solutions from copper electrorefining and electrowinning operations
A1120	Waste sludges, excluding anode slimes, from electrolyte purification systems in copper electrorefining and electrowinning operations
A1130	Spent etching solutions containing dissolved copper
A1140	Waste cupric chloride and copper cyanide catalysts
A1150	Precious metal ash from incineration of printed circuit boards not included on list B[16]
A1160	Waste lead-acid batteries, whole or crushed
A1170	Unsorted waste batteries excluding mixtures of only list B batteries. Waste batteries not specified on list B containing Annex I constituents to an extent to render them hazardous
A1180	Waste electrical and electronic assemblies or scrap[17] containing components such as accumulators and other batteries included on list A, mercury-switches, glass from cathode-ray tubes and other activated glass and PCB-capacitors, or contaminated with Annex I constituents (e.g., cadmium, mercury, lead, polychlorinated biphenyl) to an extent that they possess any of the characteristics contained in Annex III (note the related entry on list B B1110)[18]
A1190	Waste metal cables coated or insulated with plastics containing or contaminated with coal tar, PCB[19], lead, cadmium, other organohalogen compounds or other Annex I constituents to an extent that they exhibit Annex III characteristics.

[16] Note that mirror entry on list B (B1160) does not specify exceptions.

[17] This entry does not include scrap assemblies from electric power generation.

[18] PCBs are at a concentration level of 50 mg/kg or more.

[19] PCBs are at a concentration level of 50 mg/kg or more.

Table 11: Annex IX of the Basel Convention (Non-Hazardous Wastes) (Example of section B1 Metal and metal-bearing wastes)

B1010	Metal and metal-alloy wastes in metallic, non-dispersible form: Precious metals (gold, silver, the platinum group, but not mercury), Iron and steel scrap, Copper scrap, Nickel scrap, Aluminium scrap, Zinc scrap, Tin scrap, Tungsten scrap, Molybdenum scrap, Tantalum scrap, Magnesium scrap, Cobalt scrap, Bismuth scrap, Titanium scrap, Zirconium scrap, Manganese scrap, Germanium scrap, Vanadium scrap, Scrap of hafnium, indium, niobium, rhenium and gallium, Thorium scrap, Rare earths scrap, Chromium scrap
B1020	Clean, uncontaminated metal scrap, including alloys, in bulk finished form (sheet, plate, beams, rods, etc), of: Antimony scrap, Beryllium scrap, Cadmium scrap, Lead scrap (but excluding lead-acid batteries), Selenium scrap, Tellurium scrap
B1030	Refractory metals containing residues
B1031	Molybdenum, tungsten, titanium, tantalum, niobium and rhenium metal and metal alloy wastes in metallic dispersible form (metal powder), excluding such wastes as specified in list A under entry A1050, Galvanic sludges
B1040	Scrap assemblies from electrical power generation not contaminated with lubricating oil, PCB or PCT to an extent to render them hazardous
B1050	Mixed non-ferrous metal, heavy fraction scrap, not containing Annex I materials in concentrations sufficient to exhibit Annex III characteristics
B1060	Waste selenium and tellurium in metallic elemental form including powder
B1070	Waste of copper and copper alloys in dispersible form, unless they contain Annex I constituents to an extent that they exhibit Annex III characteristics
B1080	Zinc ash and residues including zinc alloys residues in dispersible form unless containing Annex I constituents in concentration such as to exhibit Annex III characteristics or exhibiting hazard characteristic H4.3
B1090	Waste batteries conforming to a specification, excluding those made with lead, cadmium or mercury
B1100	Metal-bearing wastes arising from melting, smelting and refining of metals: Hard zinc spelter, Zinc-containing drosses (…), Aluminium skimmings (or skims) excluding salt slag, Slags from copper processing for further processing or refining not containing arsenic, lead or cadmium to an extent that they exhibit Annex III hazard characteristics, Wastes of refractory linings, including crucibles, originating from copper smelting, Slags from precious metals processing for further refining, Tantalum-bearing tin slags with less than 0.5% tin
B1110	Electrical and electronic assemblies: Electronic assemblies consisting only of metals or alloys, Waste electrical and electronic assemblies or scrap (including printed circuit boards) not containing components such as accumulators and other batteries included on list A, mercury-switches, glass from cathode-ray tubes and other activated glass and PCB-capacitors, or not contaminated with Annex I constituents (e.g., cadmium, mercury, lead, polychlorinated biphenyl) or from which these have been removed, to an extent that they do not possess any of the characteristics contained in Annex III (note the related entry on list A A1180), Electrical and electronic assemblies (including printed circuit boards, electronic components and wires) destined for direct reuse, and not for recycling or final disposal
B1115	Waste metal cables coated or insulated with plastics, not included in list A1190, excluding those destined for Annex IVA operations or any other disposal operations involving, at any stage, uncontrolled thermal processes, such as open-burning.
B1120	Spent catalysts excluding liquids used as catalysts, containing any of: (…)
B1130	Cleaned spent precious-metal-bearing catalysts
B1140	Precious-metal-bearing residues in solid form which contain traces of inorganic cyanides
B1150	Precious metals and alloy wastes (gold, silver, the platinum group, but not mercury) in a dispersible, non-liquid form with appropriate packaging and labelling
B1160	Precious-metal ash from the incineration of printed circuit boards (note the related entry on list A A1150)
B1170	Precious-metal ash from the incineration of photographic film
B1180	Waste photographic film containing silver halides and metallic silver
B1190	Waste photographic paper containing silver halides and metallic silver
B1200	Granulated slag arising from the manufacture of iron and steel
B1210	Slag arising from the manufacture of iron and steel including slags as a source of TiO_2 and vanadium
B1220	Slag from zinc production, chemically stabilized, having a high iron content (above 20%) and processed according to industrial specifications (e.g., DIN 4301) mainly for construction
B1230	Mill scaling arising from the manufacture of iron and steel
B1240	Copper oxide mill-scale
B1250	Waste end-of-life motor vehicles, containing neither liquids nor other hazardous components

Compared to the European LoW Annex VIII and IX of the Basel Convention are not designed and structures in a more systematic way. The lower number of entries of the Basel lists compared to the LoW is achieved by aggregating waste types with the background of trans-boundary shipment of waste.

Other structure

Most wastes as generated in practice are mixtures of different materials and/or substances:

- Partly the wastes are characterised by their main component (mass or volume based view),
- partly waste properties are very much influenced by contaminants (e.g. hazardous substance),
- partly the most relevant component is a precious components (e.g. precious metals) and
- partly the waste can only be characterised in an appropriate way by a combination of the aspects mentioned above or by determining components and/or substances which are not present in the waste.

This situation can only be reflected in a systematic way by a comprehensive system of independent descriptors as it is the basis for scenario 1 (see vol.3 chapter 0 of this report for details).

Alternatively an approach has been developed which is closer to the present LoW. In this approach the text of the entries is largely maintained. The heterogeneity of the text of the entries and the partly unsystematic structure of the description of waste properties is accepted here in general based on the assumption that it reflects real life waste situation sufficiently. Amendment, addition and deletion of entries are done where necessary. The limited usability of such heterogeneous and unsystematic text will be moderated as an effect from making the list available to electronic processing (see vol. 3 chapter 0 of this report). New groups of waste types are introduced in the list:

- “Waste from off gas and waste water treatment”; This group will comprise around 135 entries of the present LoW (16%);
- “slags, ashes and linings from thermal processes” This group will cover 28 entries (3%) of the present LoW.
- “unspecific wastes” like “waste not otherwise mentioned” or similar entries that do not reveal any information about the waste characteristics except those that derive from the description of the origin (78 entries of the present LoW which equals 9%).

Sections 13, 14, 15 and partly 16 and 17 of the LoW are already material orientated chapters. In order to systemise the list as far as possible within the proposed structure some of the entries are shifted to other sections of the list (e.g. waste from chapter 16 like WEEE to the new section “post consumer waste”).

Summarising it can be stated that the analysis does not support the replacement of the system of the LoW by lists based on Annex VIII and IX of the Basel Convention. Concluding it is proposed to develop a European correspondence list that translates LoW codes into Basel codes and vice versa in order to reduce administrative efforts in the context of transfrontier shipment of waste.

It is proposed to structure the remaining code of the list (which does not describe the origin of a waste) in a way that waste types are grouped by general waste types.

This measure is to be combined with the possibility of electronic processing of the list (see below) in order to achieve full usability.

Measure 1c: Electronic processing of the LoW

The LoW in its present form can not be processed by electronic means because the information about the wastes is included in the text of the entries in an unsystematic way. Individual sorting and filtering of the LoW by electronic means depending on the needs of the individual user would increase usability significantly. Additionally electronic processing has been stated by stakeholders as essential for efficient management of waste assignment procedures but also regarding monitoring and control of waste flows.

Measure 1c adapts the list to the need of an electronic processing. The entries are kept in principal as they are. They are complemented with descriptions of specific characteristics of the waste. These characteristics, which might be already part of the existing text, are shown in separate columns of the entry.

Example: 10 02 07* solid wastes from gas treatment containing dangerous substances (section 10 02 "wastes from the iron and steel industry"). In order to make the entry accessible to electronic search and filter operations it is necessary to separate the information about the waste (which can usually be found in the text of the entry) in different fields. Those fields can appear in the list as columns of a table.

The following table depicts such a structure of an entry. Tha basis is the present appearance of the LoW.

Table 12: Amended way to describe waste

Economic activity	Entry – description of the waste	Process	Code	Physical state I	Physical state II	Waste category	…
Iron and steel industry 24.10	Solid wastes from gas treatment containing dangerous substances	Gas treatment	02 07*	Solid	dust	Waste from off gas treatment	

When the structure of the LoW is amended as developed in chapters 0 and 0) only the second part of the entry, which describes the waste characteristics, is re-structured. The following figure illustrates such a structure.

Description of origin	Description of waste type			
		Type	**Property I**	**Propery II**
Code for origin	Code for waste type	Sewage sludge	Containing dangerous substances	sludge

Figure 10: Illustration of the revised structure of the LoW

With this approach the content of the entry is not changed in principal but the way to describe the waste is extended. Additional columns can be used for further describing characteristics of the waste.

The question whether the LoW is structured by origin of the waste or by material related aspects will become less important because the user can apply an individual sorting depending on his needs and preferences.

It is not intended in this measure to fully systemise all information about the waste and/or to provide all information about the waste type in a systematic way. This would lead to a system of independent descriptors as it is described in scenario 1. A certain degree of unsystematic description is accepted in scenario 2.

Summary

[redacted]

[redacted]

Measure 2: New, amended and deleted entries

With this measure additional entries are taken up in the LoW in order to adapt it e.g. to new developments (e.g. new waste types) or to make it more precise (e.g. by further differentiating the entries) or to further adapt it to monitoring, control or reporting requirements.

“98” codes

A code ending with the digits “98” is used in the LoW as entry for “other hazardous waste otherwise not specified” in analogy to the codes ending with “99” for “other non-hazardous waste”. “98”-entries shall serve the purpose “to improve the control of waste streams” [TOR] and ensure that hazardous wastes for which no appropriate entry is available in the list are not assigned to non-hazardous entries.

This section analyses the introduction of “98”-codes in other sections of the LoW.

Unspecific entries for hazardous wastes are already introduced in the LoW in different sections of the LoW. Only in one case a code ending with “98” has been chosen. Examples are

07	WASTES FROM ORGANIC CHEMICAL PROCESSES
07 04	wastes from the MFSU of organic plant protection products (except 02 0108 and 02 01 09), wood preserving agents (except 03 02) and other biocides
07 04 13*	**solid wastes containing dangerous substances**
07 05	wastes from the MFSU of pharmaceuticals
07 05 13*	**solid wastes containing dangerous substances**
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 0198*	**other wastes containing dangerous substances**
11 02	wastes from non-ferrous hydrometallurgical processes
11 02 07*	**other wastes containing dangerous substances**
11 03	sludges and solids from tempering processes
11 03 02*	**other wastes**
17	CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)
17 09	construction and demolition wastes
17 09 03*	**other construction and demolition wastes (including mixed wastes) containing dangerous substances**
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 10	wastes from shredding of metal-containing wastes
19 10 05*	**other fractions containing dangerous substances**
19 12	wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified
19 12 11*	**other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11**

The entries have been introduced in cases where the involved expert groups decided that it is not appropriate to have individual entries for each waste that is possibly generated in the respective economic activity area. In other cases no general code was introduced.

Stakeholder raised concerns that general entries for hazardous waste could lead to increased assignment of waste to those codes even when a more specific would be available and that information about waste properties (and origin in some cases) is lost.

The entries of the LoW show a continuum from very detailed and specific to very general. The degree of detail of the entry has been chosen in the present LoW on a case-by-case basis depending on the availability of information and/or the need to have detailed information. In case of a general introduction of “98”-codes in each appropriate section of the LoW the degree of indefiniteness of the entry is not chosen according to the concrete needs.

In the course of the survey (see vol.1 of this report) stakeholders have been asked about missing entries in the LoW. Proposals made by the stakeholders have been taken up in the revised intermediate LoW shown in Table 21 at the end of this report when evidence was provided that there is a need for such new entry. The proposals of the stakeholders also included some entries for hazardous waste which are not very specific like “07 06 13* Liquid wastes containing hazardous substances”. Compared to a general introduction of “98”-entries this approach ensures that unspecific codes are only introduced where evidence is given that this is inevitable. The update of the LoW, and with this the uptake of new entries, is a measure which is already implemented as a routine via the provisions of the revised WFD.

This approach has the advantage that less entries for hazardous waste are available that do not provide any information about the waste characteristics: The potential increase of the number of entries is and the resulting effect on usability of the list is levelled by the measure “Electronic processing” (see this report vol.3 chapter 0).

Concluding it is proposed to maintain the present situation where new codes can be introduced in the LoW when evidence is given that for the specific case no appropriate entry is available. A procedure shall be established which makes sure that new developments and proposals from Member States are regularly considered (e.g. TAC sub-working group meeting once per year).

“99” codes

Codes ending on the digits “99” are used in the LoW as a last resort when no other appropriate entry is available. They read in most cases “wastes not otherwise specified”. “99”-codes have been introduced in the list, inter alia, in order to limit the number of entries by providing an entry where wastes can be aggregated that are not mass relevant and/or do not need specific attention because of other reasons. As a consequence only that information about the waste characteristics is available that is provided by the heading(s) of the section of the LoW.

It has been proven difficult for statistical and other purposes to use codes ending with 99.

The frequency of unused “99”-codes is relatively low. As maximum 62% of the answers from the questionnaire survey state unused “99”-codes (see also table below[20]).

Table 13: Frequency of unused “99”-codes

Code	Frequency of non-usage in the Member States that answered the question in the survey
060799	62%
190699	62%
110299	60%
060999	57%
100599	57%
100699	57%
100799	54%
191199	54%
050699	50%

The survey showed that none of the “99”-entries are unused.

Deletion of “99”-entries or at least the reduction of the number of “99”-entries would be possible when other entries are provided to assign the wastes that have been previously assigned to “99”-codes.

Presently no detailed information is available that clarifies which wastes are assigned to “99”-entries of the list. Thus it would not be possible to create new (more specific) entries to make the “99”-entries superfluous.

[20] More details are given in the Annex to this report.

The available information does not allow deleting “99”-codes from the LoW. A reduction of waste amounts assigned to “99”-entries can be expected from the other measures proposed in the course of the review of the LoW. A comprehensive solution could be a system of independent descriptors as described in scenario 1 (see chapter 0) where it is system inherent that the number of wastes that can not be described in detail by specific codes is significantly lower than in the present LoW.

New entries

Around 300 new entries have been proposed. A number of them have been in the context of European Waste Directives that require specific entries for proper management and monitoring of wastes. Others cover a broad range of application fields and waste management situations (for details see vol.1 chapter 2.9 and vol.4 Annex 13). A comprehensive list of all entries that are proposed for introduction in the LoW are given in Table 21 at the end of this report.

WEEE - new entries

Intense discussions have been performed regarding the introduction of new, differentiated and amended entries to improve monitoring in the context of monitoring of WEEE management in the context of the WEEE-Directive[21]. The full list of waste types relevant for a reliable monitoring of WEEE management comprises more than 80 entries [WEEE Forum Rep-Tool pers.com. July 2008]. Several waste types are already covered in other sections of the LoW (e.g. fractions from treatment of WEEE which are covered by generic entries of the list in the section “waste management activities”).

[21] Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE)

The following consolidated list is proposed for the section “Wastes from electrical and electronic equipment”.

		wastes from electrical and electronic equipment
01		large (household) appliances other than cooling and freezing appliances
02	*	mix of cooling & freezing appliances incl. cfc/hcfc/hfc-appliances
03	*	cfc/hcfc/hfc cooling & freezing appliances
04	*	cfc/hcfc cooling & freezing appliances
05	*	hfc cooling & freezing appliances
06	*	cabinets' containing cfc/hcfc-foam insulation (all)
07	*	cfc/hcfc-appliances delivered without compressors
08	*	cfc/hcfc air conditioner appliances
09		NH_3 cooling & freezing appliances
10	*	other cooling & freezing appliances
11	*	air conditioner appliances
12		it and telecommunications equipment (ex monitors and ex telephones)
13		telephones and mobile telephones
14		crt monitors - it and telecommunications equipment
15		flat screen monitors - it and telecommunications equipment
16		consumer equipment (ex tv-sets)
17		tv-sets - consumer equipment
18		crt tv-sets - consumer equipment
19		flat screen tv-sets - consumer equipment
20	*	straight fluorescent tubes
21	*	other fluorescent lamps
22		other lamps (haz. sub.)
23	*	other lamps (no haz. sub.)
24		electrical and electronic tools
25		toys, leisure and sports equipment
26		medical devices
27		monitoring and control instruments
28		automatic dispensers - no cooling function
29		automatic dispensers - cooling function
30		(other) small appliances
31		other weee

Entries 09 01 10 (single-use cameras without batteries), 09 01 11* (single-use cameras containing batteries included in 16 06 01, 16 06 02 or 16 06 03) and 09 01 12 (single-use cameras containing batteries other than those mentioned in 09 01 11) are proposed to be deleted because they are covered by the relevant provisions of the WEEE Directive and the respective monitoring activities

N.B. See also the chapter 0 about sub-codes in this report.

ELV - new entries

Stakeholders proposed a number of amendments in the context of the End-of-life-vehicle Directive[22]. Fuel filters as an addition to the existing entry for oil filters and components containing hazardous substances as hazardous waste entry have been taken up in the proposal.

Other filters from vehicles without hazardous components are usually not dismantled. If they occur (e.g. from removal of other components) they are usually disposed with other non hazardous wastes under a general entry. No environmental advantage has been identified from a new entry in the list and no need from a monitoring point of view for a specific entry.

New or amended codes proposed in the context of the ELV Directive

16 01 07 * oil filters and fuel filters
16 01 24 * Components which contain hazardous substances

Batteries new entries

A number of amendments for codes for waste batteries and accumulators have been proposed. Most of them have been made concerning the proper classification as hazardous or non-hazardous waste (see vol.2 chapter 6.2.6.25 of this report for detailed analysis). The Batteries Directive[23] played a minor role.

It is proposed to amend the section 16 06 of the LoW as follows:

16	**Wastes not otherwise specified in the list**
16 06	**Batteries and accumulators**
16 06 01*	lead batteries
16 06 02*	Ni-Cd batteries
16 06 03*	mercury-containing batteries
16 06 04	discharged alkaline and zinc carbon cells (except 16 06 03 and 16 06 05)
16 06 05*	batteries and accumulators other than those mentioned 16 06 01, 16 06 02 and 16 06 03 containing hazardous substances
16 06 06*	separately collected electrolyte from batteries and accumulators
16 06 07*	mixed batteries and accumulators
16 06 08*	Ni-Mh-batteries
16 06 09*	Lithium batteries

[22] Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles

[23] Directive 2008/103/EC of the European Parliament and of the Council of 19 November 2008 amending Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators as regards placing batteries and accumulators on the market Text with EEA relevance

ELS – new entries

In the context of End-of-Life-Ships and the dismantling of ships[24] new entries have been proposed.

It is proposed to include the following entries in a new section in the LoW:

16	**12**			**waste from end of life ships and other means used for the maritime transport**
16	12	01	*	end-of-life ships
16	12	02		end-of-life ships, containing neither liquids nor other hazardous components
16	12	03	*	oil containing metallic components
16	12	04	*	components containing mercury
16	12	05	*	components containing PCBs
16	12	06	*	explosive components
16	12	07	*	components containing asbestos
16	12	08	*	hazardous components other than those mentioned in 16 12 03 to 16 12 07
16	12	09		components not otherwise specified
16	12	10	*	waste oil and fuels
16	12	11	*	oil water mixtures
16	12	12	*	aqueous liquids for further treatment
16	12	13	*	other fluids
16	12	14		other fluids not mentioned in 16 12 10 to 16 12 13
16	12	15		ferrous metal
16	12	16		non-ferrous metal
16	12	17		plastic
16	12	18		glass
16	12	19	*	hazardous components other than those mentioned in this section
16	12	20		components not otherwise specified
16	12	99		wastes not otherwise specified

CCS – new entries for waste from carbon capture and sequestration

CO_2 Capture and Storage is a means of mitigating the release of CO_2 emissions from fuel combustion into the atmosphere. It can be applied to the combustion of carbon containing fuels and in certain industrial processes, such as the production of hydrogen, ammonia, iron and steel, or cement. Capturing CO_2 involves separating the CO_2 from some other gases. The CO_2 must then be transported to a storage site where it will be stored away from the atmosphere for a very long time. In order to have a significant effect on atmospheric concentrations of CO_2, storage reservoirs would have to be large relative to annual emissions. CO_2 capture and storage is more appropriate for large sources – such as central power stations, refineries, ammonia, and iron and steel plants – than for small, dispersed emission sources.

[24] see also COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS COM(2008) 767 final

Different methods of capture are possible:

- Post-combustion: CO_2 is extracted from flue gases via chemical or physical absorption, after burning the fuel. E.g. aminwash. CO_2 is absorbed via alkaline solutions, after desorption of CO_2
- Pre-combustion (IGCC = Integrated Gasification Combined Cycle): CO_2 is extracted before combustion: the fuel is partially oxidized, for instance in a gasifier. The resulting syngas (CO and H_2) is shifted into CO_2 and more H_2 by addition of water vapour. CO_2 is sequestered via gas scrubbing, H_2 can be captured and used as a fuel.
- Oxy-fuel method: The fuel is burned in oxygen instead of air, resulting in flue gas consisting of mainly carbon dioxide and water vapour. The latter is condensed through cooling. The result is an almost pure carbon dioxide stream
- Chemical Looping Combustion (CLC): Fuel reacts with metal oxide particles in a fluidized bed combustor, producing solid metal particles and a mixture of carbon dioxide and water vapor. The water vapor is condensed, leaving pure carbon dioxide which can be sequestered. The solid metal particles are circulated to another fluidized bed where they react with air, producing heat and regenerating metal oxide particles that are recirculated to the fluidized bed combustor.

Liquid/ supercritical/ gaseous CO_2 from capturing can be **transported** via pipelines, by tank wagons and by ship. In practice, because of the huge volumes involved, only pipelines and ships are cost-effective options. Solid from capturing like minerals (bicarbonates, hydrates) and dry ice can be transported by trucks and ships.

In case of liquid/supercritical **storage** CO_2 is injected at sufficiently high pressures and temperatures that it becomes a supercritical fluid.

For Mineral storage:CO_2 is converted to bicarbonates by reaction with calcium or magnesium silicate (using limestone) or hydrates and stored in former mines or dumps

For storage as dry ice CO_2 is converted to dry ice, which is discharged into the sea from a ship.

In case of biomass storage crop residue / corn stalks /excess hay are gathered into large weighted bales of biomass and deposited in the alluvial fan areas of the deep ocean basin.

New codes for solid wastes from CCS could cover cases where CO_2 is stored in solid form or where it is stored in containers. In the present state the relevance of such a code for successful implementation of CCS strategies is assumed to be small. Thus it is proposed to have minimal number of new entries. It is proposed to ad a new entry in the section on thermal processes and all the sub-sections related to big plants where CCS could be introduced in the future:

“CO_2 containing waste from CCS activities”

Deleted entries

Stakeholders also proposed a number of entries for deletion. As a second criterion the use frequency of the entry can be applied (see vol.1 chapter 2.2.2 for details).

Some restrictions must be observed in this context:

- Not all Member States provided information about the usage of waste codes (13 respectively 14 of 27),
- The rare use of several waste codes might be influenced by the production structures in the Member States. Even when a waste code is not use in 26 Member State it might be important for the 27th Member State (prominent example is waste from oil shale processing which is only generated in Estonia),
- It seems that some waste codes are used for wastes which are not originally intended for that code (e.g. 10 13 09* wastes from asbestos-cement manufacture containing asbestos; 10 13 10 wastes from asbestos-cement manufacture other than those mentioned in 10 13 09 where it is unlikely that relevant amounts are produced after the 1991 and 1999 ban of asbestos; or 20 01 31* separately collected cytotoxic and cytostatic medicines). Thus, in some cases waste codes seem to be in use because other appropriate codes are missing.

Concluding it is proposed that prior to a deletion of codes a candidate list is provided for feedback from stakeholders and/or an expert working group. Based on the two approaches mentioned above the following candidate list is proposed as a starting point for the proposed feedback procedure:

Table 14: List of candidate entries for removal from the LoW

		Criterion		
		Low frequency of use	Low amounts	Mentioned as superfluous
010411	wastes from potash and rock-salt processing other than those mentioned in 01 04 07	X		
020302	wastes from preserving agents		X	
020602	wastes from preserving agents		X	
050111	wastes from cleaning of fuels with bases	X		
050113		X		X
050114	wastes from cooling columns		X	
050604	waste from cooling columns	X		
060702	activated carbon from chlorine production		X	
060703	barium sulphate sludge containing mercury	X		
060802	wastes containing dangerous chlorosilanes		X	
060902	phosphorous slag		X	
060903	calcium-based reaction wastes containing or contaminated with dangerous substances	X		
060903	calcium-based reaction wastes containing or contaminated with dangerous substances		X	
061101	calcium-based reaction wastes from titanium dioxide production	X		
070410	other filter cakes and spent absorbents		X	
070412	sludges from on-site effluent treatment other than those mentioned in 07 04 11	X		
070499	wastes not otherwise specified		X	
080319	disperse oil	X		
090110	single-use cameras without batteries	X	X	X
090111	single-use cameras containing batteries included in 16 06 01, 16 06 02 or 16 06 03	X	X	X
090112	single-use cameras containing batteries other than those mentioned in 09 01 11	X	X	X
100126	wastes from cooling-water treatment			X
100324	solid wastes from gas treatment other than those mentioned in 10 03 23		X	
100326	sludges and filter cakes from gas treatment other than those mentioned in 10 03 25	X		
100328	wastes from cooling-water treatment other than those mentioned in 10 03 27	X		
100329	wastes from treatment of salt slags and black drosses containing dangerous substances	X		
100330	wastes from treatment of salt slags and black drosses other than those mentioned in 10 03 29	X		
100403	calcium arsenate	X		
100409	wastes from cooling-water treatment containing oil	X		
100410	wastes from cooling-water treatment other than those mentioned in 10 04 09	X		
100508	wastes from cooling-water treatment containing oil	X	X	
100509	wastes from cooling-water treatment other than those mentioned in 10 05 08	X		
100609	wastes from cooling-water treatment containing oil	X		
100610	wastes from cooling-water treatment other than those mentioned in 10 06 09	X		
100701	slags from primary and secondary production		X	
100702	dross and skimmings from primary and secondary production		X	
100703	solid wastes from gas treatment	X		
100704	other particulates and dust		X	
100705	sludges and filter cakes from gas treatment	X		
100707	wastes from cooling-water treatment containing oil	X		
100708	wastes from cooling-water treatment other than those mentioned in 10 07 07	X		
100812	tar-containing wastes from anode manufacture	X		
100813	carbon-containing wastes from anode manufacture other than those mentioned in 10 08 12	X	X	
100814	anode scrap		X	
100818	sludges and filter cakes from flue-gas treatment other than those mentioned in		X	

		Criterion		
		Low frequency of use	Low amounts	Mentioned as superfluous
	10 08 17			
100819	wastes from cooling-water treatment containing oil	X		
100820	wastes from cooling-water treatment other than those mentioned in 10 08 19	X		
100915	waste crack-indicating agent containing dangerous substances	X		
100916	waste crack-indicating agent other than those mentioned in 10 09 15	X		
101014	waste binders other than those mentioned in 10 10 13	X		
101015	waste crack-indicating agent containing dangerous substances	X		
101016	waste crack-indicating agent other than those mentioned in 10 10 15	X		
101401	waste from gas cleaning containing mercury	X		
110203	wastes from the production of anodes for aqueous electrolytical processes		X	
110206	wastes from copper hydrometallurgical processes other than those mentioned in 11 02 05	X		
130309	readily biodegradable insulating and heat transmission oils		X	
130801	desalter sludges or emulsions		X	
160108	components containing mercury		X	
160109	components containing PCBs		X	
160110	explosive components (e.g. air bags)		X	
160116	tanks for liquefied gas		X	
160401	waste ammunition		X	
160505	gases in pressure containers other than those mentioned in 16 05 04		X	
160901	permanganates, e.g. potassium permanganate		X	X
160902	chromates, for example potassium chromate, potassium or sodium dichromate			X
160903	peroxides, for example hydrogen peroxide			X
160904	oxidising substances, not otherwise specified			X
161001	aqueous liquid wastes containing dangerous substances			X
161002	aqueous liquid wastes other than those mentioned in 16 10 01			X
161003	aqueous concentrates containing dangerous substances			X
161004	aqueous concentrates other than those mentioned in 16 10 03			X
180110	amalgam waste from dental care		X	
180206	chemicals other than those mentioned in 18 02 05		X	
190119	sands from fluidised beds		X	
190401	vitrified waste	X		
190403	non-vitrified solid phase	X		
190404	aqueous liquid wastes from vitrified waste tempering	X		
190502	non-composted fraction of animal and vegetable waste		X	
190605	liquor from anaerobic treatment of animal and vegetable waste	X		
191102	acid tars	X	X	
191104	wastes from cleaning of fuel with bases	X	X	
191107	wastes from flue-gas cleaning	X		
191304	sludges from soil remediation other than those mentioned in 19 13 03	X		
200131	cytotoxic and cytostatic medicines			X

Measure 3: Sub-codes

This measure allows introducing sub-codes in the LoW where appropriate. Sub-codes are codes that are ordered on a level below the usual entries of the list. They can be applied where differentiated descriptions of waste properties are needed for specific purposes.

Examples for further differentiated waste descriptions are shown in the table below.

Table 15: Differentiated systems for the description of waste properties (exemplary cases)

Waste type	LoW entries	Differentiated descriptions
Waste paper	The Low provides three entries for waste paper and cardboard which differ only regarding the origin: 15 01 01, 19 12 01, 20 01 01	The European paper industry applies a coding system on European level which describes the quality of separately collected paper on the basis of EN643 • Code: "VWXYZ" • V = group, 0=not defined, 1=ordinary, 2=medium, 3=high, 4=kraft, 5=special, • W = grade (2nd digit 0-9 • X = grade (3rd digit, 0-9) • Y = sub-grade (4th digit, 0-9) • Z = sub-grade (5th digit, 0-9)
Ferrous scrap	The LoW provides 4 entries for which the applied criteria for differentiation are relatively close to those applied in the European Steel Scrap Specifications	The European Steel Scrap Specifications differentiate categories of ferrous scrap depending on origin and the properties
	16 01 17, 19 12 02	E3 - Old thick steel scrap
	16 01 17, 19 12 02	E1 - Old thin steel scrap
	16 01 17	E2 - Thick new production steel scrap
	16 01 17	E8 - Thin new production steel scrap
	16 01 17	E6 - New production thin steel scrap
	19 10 01	E40 - Shredded steel scrap
	12 01 01	E5H - Homogeneous lots of carbon steel turnings
	12 01 01	E5M - Mixed lots of carbon steel turnings
	16 01 17	EHRB - Old and new steel scrap consisting mainly of rebars and merchant bars
	16 01 17	EHRM - Old and new mechanical pieces and components
	19 01 02	E46 - Fragmentized incinerator scrap
Waste wood	The LoW provides entries that are describing the contaminations of	The German Waste Wood Ordinance differentiates on a national level in 4 categories of waste wood depending on the contamination.

• Waste type	• LoW entries	• Differentiated descriptions
	waste wood less differentiated than the a national waste wood ordinance.	
	• 03 01 05, 15 01 03, 17 02 01, 20 01 38	• A I (natural wood)
	• 03 01 05, 15 01 03, 17 02 01, 20 01 38	• A II coated and/or glued wood
	• 15 01 03, 20 01 38, 20 03 07	• A III waste wood contaminated with halogen organic substances (except preservatives)
	• 15 01 10 *, 17 02 04 *, 19 12 06 *	• A IV (wood with preservatives) depending on contamination

Waste type	LoW entries	Differentiated descriptions
WEEE	The LoW provides 8 codes for WEEE that are not related to certain origins (section 16) and 4 entries in the section 20	The European Association of WEEE Compliance Schemes use a list of WEEE-related waste types in order to fulfil the monitoring and recovery requirements of the WEEE Directive
	16 02 09, 16 02 10, 16 02 11, 16 02 12, 16 02 13, 16 02 14, 16 02 15, 16 02 16 20 01 21, 20 01 23, 20 01 35, 20 01 36	large (household) appliances other than cooling and freezing appliances
		mix of cooling & freezing appliances incl. cfc/hcfc/hfc-appliances
		cfc/hcfc/hfc cooling & freezing appliances
		cfc/hcfc cooling & freezing appliances
		hfc cooling & freezing appliances
		cabinets' containing cfc/hcfc-foam insulation (all)
		cfc/hcfc-appliances delivered without compressors
		cfc/hcfc air conditioner appliances
		NH_3 cooling & freezing appliances
		other cooling & freezing appliances
		air conditioner appliances
		it and telecommunications equipment (ex monitors and ex telephones)
		telephones and mobile telephones
		crt monitors - it and telecommunications equipment
		flat screen monitors - it and telecommunications equipment
		consumer equipment (ex tv-sets)
		tv-sets - consumer equipment
		crt tv-sets - consumer equipment
		flat screen tv-sets - consumer equipment
		straight fluorescent tubes
		other fluorescent lamps
		other lamps (haz. sub.)
		other lamps (no haz. sub.)

Waste type	LoW entries	Differentiated descriptions
		electrical and electronic tools
		toys, leisure and sports equipment
		medical devices
		monitoring and control instruments
		automatic dispensers - no cooling function
		automatic dispensers - cooling function
		(other) small appliances
		other weee

A precise adjustment of upper codes and sub-codes is a crucial prerequisite for the use of sub-codes and to ensure that sub-code are not in contradiction with the upper code.

As a consequence the waste list becomes more differentiated and wastes could be described more precise via the waste codes. Complexity increases only for stakeholders that are participating in affected treatment chains and use the sub-codes. Those who do not use sub-codes can further apply the upper codes (which have the character of aggregated sub-codes).

As an alternative to sub-codes new sections could be introduced in the LoW that comprise the additional entries. This will result in an extended list with an increased number of sections and the related consequences for the usability of the list.

Taking up stakeholders' proposal it is proposed to have the following entries as general entries for WEEE in the LoW:

01* discarded equipment containing or contaminated by PCBs other than those mentioned in 16 02 09
02* discarded equipment containing chlorofluorocarbons, HCFC, HFC
03* discarded equipment containing free asbestos
04* discarded equipment containing hazardous components other than those mentioned in 01 to 03
05 discarded equipment other than those mentioned in 01 to 04
06* hazardous components removed from discarded equipment
07 components removed from discarded equipment other than those mentioned in 06

Other entries as proposed by the WEEE-Forum are introduced as sub-entries. It is proposed to publish them as European Standard and refer to them in an annex to the LoW.

For other waste types sub-codes might be introduced when stakeholders require doing so. This can include sub-codes on national level as long as they do not contradict the European codes.

Revised LoW

This section illustrates the outcome from measures that are part of scenario 2.

The list (Table 21[25]) is a raw interim list ("track changes list") where in the existing list new entries have been added ("n" in the column "New/ deleted/ amended"), existing entries have been amended ("a" in the column "New/ deleted/ amended"), or marked as "to be deleted" ("d" in the column "New/ deleted/ amended").

The digits of the entries are maintained and not yet adapted to the new list in order to enable better traceability of the changes.

Several entries are shifted to new section. In some section entries can be aggregated (e.g. sludges from on-site effluent treatment) due to the fact hat the origin is detached from the remaining code. This is not yet realised in the raw interim list in order to ease comprehensi-bility of the changes.

In some cases only the headings of the sections are maintained (e.g. 16 02 waste from elec-tric and electronic equipment). New digits on the third level have been added in those cases in order to ease identification of entries in further discussion about the list.

New entries that have been proposed by stakeholders have been added as long as they are not in contradiction with other entries and they fit into the structure of the entries.

The list includes around 230 new entries, almost 30 amended entries and almost 20 entries are marked as "to be deleted".

The preliminary "track changes" - list has two general sections:

- Part I: Waste from commercial processes (manufacturing/formulation of substances, mixtures and articles),
- Part II Post consumer waste (end of service life articles),

The level 2 headings are maintained in principal and few new sections are introduced. The entries of section 16 will be shifted to other sections.

[25] for practical reasons and to support reading of the text the table has been shifted to the end of the text

Table 16: Level 2 – headings of the preliminary track changes LoW

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

The level-3-headings are partly amended, most often by removal of the term “use” in headings with the expression “Manufacture, formulation, supply and use …(MFSU).

Some new level-3-sections are introduced according to the proposals from stakeholders (see volume 1 of this report):

- Waste from production and/ or processing of plastic laminate and decorative panels
- Waste from off gas treatment
- Slags, ashes, linings
- Waste from end of life ships and other means used for maritime transport

When the concept for a revised list, which is outlined in scenario 2, is applied the number of entries can be reduced due to the detachment of the description of the origin from the remaining code.

In the group ""Waste from off gas and waste water treatment" the number of entries can be reduced from 135 to 45 entries. In the group "slags, ashes and linings from thermal processes" 28 entries can be reduced to 10 entries). In the group "unspecific wastes" (e.g. "waste not otherwise mentioned"[26]) the number can be reduced from 78 entries to around 35 entries. In the heterogeneous group "waste management activities" 124 entries can be reduced to around 85 entries.

According to the answers from the stakeholder surveys and the analysis of actual usage of entries it can be appraised that around 10-20% of the entries could be deleted. However, this is not specific to scenario 2 but will also be the case in the baseline scenario due to the existing requirement to adapt the list regularly to new developments.

[26] Or similar entries that do not reveal any information about the waste characteristics except those that derive from the description of the origin.

Impacts

Scenario 2 aims at improving the LoW by maintaining basic elements of the LoW and making moderate amendments (compared to the ID-system in scenario 1).

This scenario does not achieve the degree of transparency of the ID-System and it is less systematic. It takes up elements of the ID-system and implements them with as moderate changes of the LoW as possible in order to minimise the efforts from change of system as far as possible.

Usability on the level of encoding of waste properties is improved by reducing the number of entries and making the list accessible to computerised processing. Decoding of waste properties is improved by a more systematic structure of the list (origin detached from waste characteristics).

New entries do not necessarily change the revised LoW to an extent as it is the case in the baseline scenario. In the example of waste from processing of oil shale it is necessary in the present LoW to build a new section. In a revised LoW it would just be necessary to add one origin in the list of origins without creating a new section or without changing the list of waste characteristics.

Impacts of scenario 2 on administrative efforts compared to the baseline scenario are shown in the following list differentiated by stakeholders type. For details about the stakeholder type2 refer to vol.3 chapter 3 of this report.

a) Small waste producer

Improved usability of the list from reduced number of entries will result reduced efforts for identification of appropriate entries and the encoding of waste properties (continuous impact).

The possibility of electronic processing of the list improves its usability (continuous impact). The description of waste characteristics in additional columns will result in better (and easy accessible) understanding of what is meant by the entries of the list and improved congruence of encoding and decoding. This positive impact is stronger for small waste producers without sophisticated IT system for processing of waste data than for big companies and in the case of one off wastes compared to recurring wastes.

In the overwhelming number of cases the change from old to new codes will be a 1:1 change. This will reduce the efforts from the change of the system significantly compared to scenario 1, where a fully new system must be applied[27]

The use of sub-codes instead of having all entries with 6-digit codes in the list will additionally reduce efforts for finding an appropriate entry. This measure is proposed only for WEEE-related wastes (as long as no stakeholder requires similar ap-

[27] This can be supported by a conversion tool.

proaches for other waste streams). Consequently this advantage is relevant for stakeholders that are not involved in WEEE management (some hundred thousand companies). For those who are involved (~1000 to 000 compliance schemes) no relevant difference to the baseline scenario occurs.

b) Large waste producer

Impacts on administrative efforts are similar as for small waste producers but the magnitude of impacts is smaller.
The translation table used in sophisticated IT system as interface between internal and external waste codes must be adapted (one-off impact). The more systematic description of the origin will reduce the number of ambiguities in the "translation table" (continuous impact). (This impact is stronger for scenario 1 than for scenario 2 because of the more systematic structure of scenario 1).
The improved usability of the list from reduced number of entries and the resulting reduced efforts for identification of appropriate entries will be less significant as for small companies, because the assignment is done mostly for recurring wastes.
As for small waste producers usability will be improved by making the list accessible to electronic processing (continuous impact). However, because of using internal electronic data management and more recurring wastes the positive impact will be small.
Same can be stated for the impacts from the introduction of sub-codes. The impact on conduction of business is lower because of more sophisticated IT system and specialised personnel for waste management tasks.

c) Small waste management company

Additional time is necessary to assign amended codes to the wastes compared to further use of the old codes (one off impact). The reduced number of entries will result in improved usability (continuous impact).
Additional elements describing the waste (from making the list accessible to electronic processing) can result in an improved common understanding between waste producer and waste management company of what is meant by an entry of the waste list and thus leads to improved functioning of the list as a communication instrument. It is expected that this impact will be marginal.
The use of sub-codes for WEEE managements improves monitoring capabilities by using a common set of waste codes. Difference between baseline scenario and scenario 2 is marginal if all waste codes for WEEE are introduced in the baseline scenario as well.

d) Large waste management company

The interface between internal and external codes must be re-designed (one-off impact). Linking wastes (with external codes) with internal codes will become more reliable when the LoW is made accessible for electronic processing.
The reduced number of entries will result in improved usability (continuous impact). The efforts and benefits per waste type are assumed to be smaller than for small waste management companies as described in c) because of the automated data processing system and the predominance of recurring wastes.
As for small waste producers positive but marginal impacts regarding the communi-

cation between waste producer and waste management company result from making the list accessible for electronic processing.

e) Authorities that permit and control installations
Permits must be adapted to new waste codes (one off impact). In some Member States a periodic review of permits is obligatory. When the amendment of waste codes is done in the course of the review of permits the additional administrative efforts will be marginal. In most of the cases a 1:1 translation between the old and the new list is expected to be possible.

f) Authorities that monitor and control waste flows
New waste codes will result in a risk of discontinuity of waste statistics where the entries are not replaced by new entries 1:1 (e.g. where 1 old entry is replaced by 2 more differentiated new entries (one off impact). This impact will be rare for scenario 2 and frequently for scenario 1
Improvements of waste statistics will be achieved for waste types where the description of the originating economic activity is improved by the amended descriptions of origin (continuous impact).
Monitoring of waste flows which are affected from sub-codes will not differ significantly compared to the baseline scenario.

Regarding environmental aspects the table overleaf summarises the analysis of impacts. No differences can be observed between the baseline scenario and scenario 2 regarding environmental impacts from new and deleted codes. Additional positive impacts regarding the appropriate assignment of waste to entries would result from the availability of guidance documents for all Member States. The difference of the impacts between the baseline scenario and scenario 2 is expected to be marginal.

Table 17: Summary of environmental impacts in scenario 2

		Measure 1a + 1b (origin detached)		Measure 1c Electronic processing		Measure 3 Sub-codes	Overall impact
Does the measure support an easy/simplified classification of wastes with regard to their environmental properties and hazardousness?	0	No effect compared to base-line scenario	0/+	Improved assignment of waste to entries results in improved application of risk management measures	+	Positive impact from reduced number of entries	+
Does the measure support the assessment of environmental impacts arising from the waste in the context of its impacts during its whole life cycle?	0	No effect compared to base-line scenario	0	No effect compared to baseline scenario	0	No effect com-pared to baseline scenario	0
Does the measure support that an efficient waste management is ensured or can be achieved (includes inter alia steering of wastes and the achievement of environmental objectives)?	0	No effect compared to base-line scenario	+	Positive effect can result from the improved description of the wastes and reduced ambiguity	0	No effect com-pared to baseline scenario	+
Does the measure contribute to transparency and improved monitoring of waste streams for control purposes?	+	Information about waste do not get lost when the origin of the waste changes (e.g. when sorted) Better monitoring because each waste is linked to origin	+	Positive effect can result from the improved description of the wastes and reduced ambiguity	0	No effect com-pared to baseline scenario	+
Does the measure support the verification of the effectiveness of European regulations with regard to specific waste streams?	0	No effect compared to base-line scenario	+	Positive effect can result from the improved description of the wastes and reduced ambiguity	0	No effect com-pared to baseline scenario	+
Does the measure affect the installation permits with regard to an environ-mentally sound applicability of wastes in the respective process?	0	No effect compared to base-line scenario	0	No effect compared to baseline scenario	0	No effect com-pared to baseline scenario	0
Does the measure support the functioning as basis for waste statistics regard-ing, generation, treatment, recovery and final disposal of waste aiming at delivering statistical information for policy makers and industry association (policy performance -closely linked to the efficiency of waste management)?	+	Each waste is combined with description of origin	0/+	Positive effect can result from the improved description of the wastes and reduced ambiguity	0	No effect com-pared to baseline scenario	+
Does the measure affect existing and implemented waste management legis-lation in the Member States?	0	No effect compared to base-line scenario	0	No effect compared to baseline scenario	0	No effect com-pared to baseline scenario	0
Does the measure affect other Community waste legislation, for instance the Waste Shipment Regulation (EC) No 253/93?	0	No effect compared to base-line scenario	0	No effect compared to baseline scenario	0	No effect com-pared to baseline scenario	0
Does the measure provide for flexibility to detail the codes agreed on the EU level by country specific (sub) entries?	0	No effect compared to base-line scenario	0	No effect compared to baseline scenario	+		+

Scenario 2 groups individual measures in order to take the interrelation of the measures into account appropriately. Isolated implementation of measure 1a plus 1b (detach of origin and rest of code) is theoretically possible without implementation of measure 1c “electronic processing”. But this would reduce usability significantly and is not recommended. Measure 1c “electronic processing” can be implemented as isolated measure. Introduction of new entries, amendment and deletion of entries (measure 2) can be realised without implementation of measure 1. Same is valid for regarding the development of a guidance document.

5 Summary

Two scenarios have been analysed in addition to the baseline scenario regarding structural review of the LoW: The table below summarises the elements of the scenarios

Table 18: Overview: Differences of the scenarios

•	• Baseline	• Scenario 1	• Scenario 2
• Structure of the lis	• Mix of origin- and material based structure	• Matrix	• Combination of two structuring elements: origin and material
• Description of the origin	• Yes; unsystematically	• Yes; systematically	• Yes, not fully systematic
• Description of material	• Yes; unsystematically	• Yes; systematically	• Yes, unsystematically
• Electronic processing	• No	• Yes	• Yes
• New entries	• Yes, new 6-digit codes; update routine	• If necessary at all new elements in the tables of descriptors; seldom case	• Yes, new element to describe waste properties; new origins unlikely; update routine
• General entries for hazardous waste ("98" – codes)	• Few	• Hardly necessary	• Few
• General entries for non-hazardous waste ("99" – codes)	• Yes, in almost every section	• Hardly necessary	• Yes, in almost every section
• Deletion of codes	• Yes, deletion of 6-digit codes; update routine	• Not necessary	• Yes, deletion of element to describe origin or of elements to describe waste properties; update routine
• Sub-codes	• No	• Not necessary	• Yes

Scenario 2 groups individual measures which are shown in an overview below.

Measure 1a The origin is detached from the rest of the waste codes and described in three hierarchical levels. The elements to describe the origin are maintained as it is in the present LoW and no external system (e.g. NACE) is applied.

Measure 1 b The remaining code is partly grouped by waste types. The basic approach of the LoW to describe waste characteristics (description of selected characteristics) is maintained.

Measure 1c The LoW is made accessible for electronic processing and is partly systemised for this by describing properties of the waste in kind of "columns" of the waste list

Measure 3 The instrument of “sub-codes” is introduced for entries which are only used by a limited number of specialised stakeholders for specific purposes (e.g. improved conduct of business, improved monitoring).

The tables below provide an overview of the impacts of the scenarios. A qualitative assessment has been provided where detailed data are missing. Further validation of measure would have been possible in parts with a data basis which is built on the number of waste transport instead of waste amounts and with further information about the individual waste-related permitting of an installation. Anyhow, the development of the scenarios has been possible even based on qualitative information with sufficient confidence that the intended effects will be achieved.

Table 19: Overview analysis of administrative efforts (scale of impacts: -- = much higher efforts, - = higher efforts; ++ much lower efforts, + lower efforts)

		Scenario 1		Scenario 2	
		One-off impacts	Continuous impacts	One-off impacts	Continuous impacts
Waste producer	Small	--	-	-	+
	Large	--	0	-	+
Waste management company	Small	/	-	/	+
	Large	--	0	-	+
Authority	Permitting	--	0	-	0
	Monitoring and controlling	--	0	-	+

Scenario 1 shows negative one off impacts mainly from the change of the system (introduction of waste codes of a new type and new assignment procedure). This is levelled in a medium term perspective when the stakeholders got used to the new system.

Scenario 2 also shows negative one-off impacts but with smaller magnitude than for scenario 1. In the medium term perspective the advantage from reduced number of entries, electronic processing and improved structure of the list leads to reduced efforts for the encoding and decoding of waste properties.

Table 20: Overview analysis of environmental impacts (TOR criteria) (scale of impacts: -- = very negative impact, - = negative impact; ++ significant improvement, + improvement)

	Scenario 1	Scenario 2
Does the measure support an easy/simplified classification of wastes with regard to their environmental properties and hazardousness?	++	+
Does the measure support the assessment of environmental impacts arising from the waste in the context of its impacts during its whole life cycle?	+	0
Does the measure support that an efficient waste management is ensured or can be achieved (includes inter alia steering of wastes and the achievement of environmental objectives)?	+	+
Does the measure contribute to transparency and improved monitoring of waste streams for control purposes?	++	+
Does the measure support the verification of the effectiveness of European regulations with regard to specific waste streams?	+	+
Does the measure affect the installation permits with regard to an environmentally sound applicability of wastes in the respective process?	++	0
Does the measure support the functioning as basis for waste statistics regarding, generation, treatment, recovery and final disposal of waste aiming at delivering statistical information for policy makers and industry association (policy performance -closely linked to the efficiency of waste management)?	+	+
Does the measure affect existing and implemented waste management legislation in the Member States?	0	0
Does the measure affect other Community waste legislation, for instance the Waste Shipment Regulation (EC) No 253/93?	0	0
Does the measure provide for flexibility to detail the codes agreed on the EU level by country specific (sub) entries?	0	+

Scenario 1 shows more positive answers to the criteria for environmental impacts than scenario 2 and the better assessment per criterion for 4 criteria (one time the assessment of scenario 2 is better).

6 Further steps

The objective of task 3 of the TOR was to outline an option for the future structure of the LoW. In case that it will be decided to follow scenario 2 further steps for the detailing of the outlined concept can be:

1. Add and delete all entries in Table 21 for which agreement was achieved in a stakeholders' working group.
2. Re-word the text of the entries in accordance with chapter 6.2.6.4 of vol. 2 of this report where appropriate.
3. Assign origins to the entries as developed in chapter 0 of vol. 3 of this report.
4. Re-word the remaining text of the entries appropriately by deleting parts that describe the origin and/or add parts for specific processes where necessary.
5. Make the entries accessible for electronic processing

The "four step approach" of the Annex of the LoW must then be adapted adequately after a decision about the future design is taken.

The work on the review of the LoW revealed the importance of the availability of guidance documents for proper assignment waste to codes and congruent encoding and decoding of information. As described in volume 1 of this report a number of guidance documents (GD) is available on national level. Further development of the availability of guidance documents is seen as important task not least to increase legal certainty with the use of the European List of Waste.

The direct impact for waste producers when the GD is applied will be an improved usability and reduced ambiguity with the assignment of wastes to entries of the LoW. It was stated by stakeholders that small waste producers are often reluctant with the use of guidance documents due to a lack of time. At the same time problems with the encoding of wastes occur according to the answerers of the questionnaire most often in small and medium sized companies. While larger companies have a special responsible person for waste issues, small and medium sized companies do not have such a person.

Thus a guidance document shall focus on the specific situation of SME and also includes one off waste in addition to recurring wastes.

Table 21: Intermediate "track changes" LoW

99				**Part I: Waste from commercial processes (manufacturing/formulation of substances, mixtures and articles)**	
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	
01	01	02		wastes from mineral non-metalliferous excavation	
01	**02**			**Waste from coal excavation**	n
01	02	01	*	Waste from coal excavation	n
01	02	02		Waste from coal excavation other than those in 01 02 01	n
01	**03**			**wastes from physical and chemical processing of metalliferous minerals**	
01	03	04	*	acid-generating tailings from processing of sulphide ore	
01	03	05	*	other tailings containing dangerous substances	
01	03	06		tailings other than those mentioned in 01 03 04 and 01 03 05	
01	03	07	*	other wastes containing dangerous substances from physical and chemical processing of metalliferous minerals	
01	03	08		dusty and powdery wastes other than those mentioned in 01 03 07	
01	03	09		red mud from alumina production other than the wastes mentioned in 01 03 07	
01	03	99		wastes not otherwise specified	
01	**04**			**wastes from physical and chemical processing of non-metalliferous minerals**	
01	04	07	*	wastes containing dangerous substances from physical and chemical processing of non-metalliferous minerals	
01	04	08		waste gravel and crushed rocks other than those mentioned in 01 04 07	
01	04	09		waste sand and clays	
01	04	10		dusty and powdery wastes other than those mentioned in 01 04 07	
01	04	11		wastes from potash and rock salt processing other than those mentioned in 01 04 07	
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	
01	04	13		wastes from stone cutting and sawing other than those mentioned in 01 04 07	
01	04	99		wastes not otherwise specified	
01	**05**			**drilling muds and other drilling wastes**	
01	05	04		freshwater drilling muds and wastes	
01	05	05	*	oil-containing drilling muds and wastes	
01	05	06	*	drilling muds and other drilling wastes containing dangerous substances	
01	05	07		barite-containing drilling muds and wastes other than those mentioned in 01 05 05 and 01 05 06	
01	05	08		chloride-containing drilling muds and wastes other than those mentioned in 01 05 05 and 01 05 06	
01	05	99		wastes not otherwise specified	
02				**WASTES FROM AGRICULTURE, HORTICULTURE, AQUACULTURE, FORESTRY, HUNTING AND FISHING, FOOD PREPARATION AND PROCESSING**	
02	**01**			**wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing**	
02	01	01		sludges from washing and cleaning	
02	01	02		animal-tissue waste	
02	01	03		plant-tissue waste	
02	01	04		waste plastics (except packaging)	d
02	01	06		animal faeces, urine and manure (including spoiled straw), effluent, collected separately and treated off-site	
02	01	07		wastes from forestry	
02	01	08	*	agrochemical waste containing dangerous substances	
02	01	09		agrochemical waste other than those mentioned in 02 01 08	
02	01	10		waste metal	d

02	01	11	*	hazardous animal tissue	n
02	01	12	*	hazardous plant tissue	n
02	01	13		soil from horticulture	n
02	01	14	*	other hazardous wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing	n
02	01	15		of specification seeds	n
02	01	99		wastes not otherwise specified	
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	
02	02	02		animal-tissue waste	
02	02	03		materials unsuitable for consumption or processing	
02	02	04		sludges from on-site effluent treatment	
02	02	05		meat and bone meal	n
02	02	06		animal fat waste	n
02	02	07	*	hazardous waste from the preparation and processing of meat, fish and other foods of animal origin	n
02	02	99		wastes not otherwise specified	
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	
02	03	02		wastes from preserving agents	
02	03	03		wastes from solvent extraction	
02	03	04		materials unsuitable for consumption or processing	
02	03	06		Glyzerine from the production of biodiesel and fats or residues containing fats	n
02	03	07		Residues from decanting of wine	n
02	03	08		Residues from destillation in wineries	n
02	03	99		wastes not otherwise specified	
02	**04**			**wastes from sugar processing**	
02	04	01		soil from cleaning and washing beet	
02	04	02		off-specification calcium carbonate	
02	04	04		beet chips and pulp	n
02	04	99		wastes not otherwise specified	
02	**05**			**wastes from the dairy products industry**	
02	05	01		materials unsuitable for consumption or processing	
02	05	03		whey wastes	n
02	05	99		wastes not otherwise specified	
02	**06**			**wastes from the baking and confectionery industry**	
02	06	01		materials unsuitable for consumption or processing	
02	06	02		wastes from preserving agents	
02	06	99		wastes not otherwise specified	
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	
02	07	02		wastes from spirits distillation	
02	07	03		wastes from chemical treatment	
02	07	04		materials unsuitable for consumption or processing	
02	07	06	*	materials unsuitable for consumption or processing other than those mentioned in 02 07 04	n
02	07	99		wastes not otherwise specified	
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	
03	01	04	*	sawdust, shavings, cuttings, wood, particle board and veneer containing dangerous substances	
03	01	05		sawdust, shavings, cuttings, wood, particle board and veneer other than those mentioned in 03 01 04	

03	01	06		waste padding material	n
03	01	99		wastes not otherwise specified	
03	**02**			**wastes from wood preservation**	
03	02	01	*	non-halogenated organic wood preservatives	
03	02	02	*	organochlorinated wood preservatives	
03	02	03	*	organometallic wood preservatives	
03	02	04	*	inorganic wood preservatives	
03	02	05	*	other wood preservatives containing dangerous substances	
03	02	06	*	sludges containing wood preservatives	n
03	02	99		wood preservatives not otherwise specified	
03	**03**			**wastes from pulp, paper and cardboard production and processing**	
03	03	01		waste bark and wood	
03	03	02		green liquor sludge (from recovery of cooking liquor)	
03	03	03	*	Bleaching sludges from hypochlorite and chlorine processes	n
03	03	05		de-inking sludges from paper recycling	
03	03	06	*	de-inking sludges from paper recycling other than those mentioned in 03 03 05	n
03	03	07		mechanically separated rejects from pulping of waste paper and cardboard	
03	03	08		wastes from sorting of paper and cardboard destined for recycling	
03	03	09		lime mud waste	
03	03	10		fibre rejects, fibre-, filler- and coating-sludges from mechanical separation	
03	03	12		mechanically separated metals wire from pulping of waste paper and cardboard	n
03	03	13		fabric, felts and belts from paper machine maintenance	n
03	03	99		wastes not otherwise specified	
03	**04**			**Waste from production and/ or processing of plastic laminate and decorative panels**	n
03	04	01	*	Resin waste containing hazardous substances	n
03	04	02		Resin waste other than those mentioned in 03 04 01*	n
03	04	03	*	Aqueous washing solutions containing hazardous substance	n
03	04	04		Aqueous washing soultions other than those mentioned in 03 05 04	n
03	04	05	*	Waste and scrap of impregnated Kraft paper	n
03	04	06	*	Waste and scrap of impregnated decorative paper	n
03	04	07		Scraps and paper waste other than those mentioned in 03 04 05* and 03 04 06*	n
03	04	08	*	Scraps and waste from paper relaese and/ or finishing containing hazardous substances	n
03	04	09		Scraps and waste from paper relaese and/ or finishing other than those mentioned in 03 04 08*	n
03	04	10		Offcuts and waste from plastic film release and/ or finishing	n
03	04	11		Laminate waste	n
03	04	12		Waste from composite panels	n
03	04	13		Powder, chips abd scraps of laminate and composite panels	n
03	04	14		Waste from extruded thermoplastic coposite	n
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	
04	01	02		liming waste	
04	01	03	*	degreasing wastes containing solvents without a liquid phase	
04	01	04		tanning liquor containing chromium	
04	01	05		tanning liquor free of chromium	
04	01	08		waste tanned leather (blue sheetings, shavings, cuttings, buffing dust) containing chromium	
04	01	09		wastes from dressing and finishing	
04	01	99		wastes not otherwise specified	
04	**02**			**wastes from the textile industry**	
04	02	09		wastes from composite materials (impregnated textile, elastomer, plastomer)	

04	02	10		organic matter from natural products (for example grease, wax)	
04	02	14	*	wastes from finishing containing organic solvents	
04	02	15		wastes from finishing other than those mentioned in 04 02 14	
04	02	16	*	dyestuffs and pigments containing dangerous substances	
04	02	17		dyestuffs and pigments other than those mentioned in 04 02 16	
04	02	21		wastes from unprocessed textile fibres	
04	02	22		wastes from processed textile fibres	
04	02	23	*	other hazardous waste from textile industry	n
04	02	99		wastes not otherwise specified	
05				**WASTES FROM PETROLEUM REFINING, NATURAL GAS PURIFICATION AND PYROLYTIC TREATMENT OF COAL**	
05	**01**			**wastes from petroleum refining**	
05	01	02	*	desalter sludges	
05	01	03	*	tank bottom sludges	
05	01	04	*	acid alkyl sludges	
05	01	05	*	oil spills	
05	01	06	*	oily sludges from maintenance operations of the plant or equipment	
05	01	07	*	acid tars	
05	01	08	*	other tars	
05	01	11	*	wastes from cleaning of fuels with bases	
05	01	12	*	oil containing acids	
05	01	13		boiler feedwater sludges	d
05	01	14		wastes from cooling columns	
05	01	15	*	spent filter clays	
05	01	16		sulphur-containing wastes from petroleum desulphurisation	
05	01	17		bitumen	
05	01	99		wastes not otherwise specified	
05	**06**			**wastes from the pyrolytic treatment of coal**	
05	06	01	*	acid tars	
05	06	03	*	other tars	
05	06	04		waste from cooling columns	
05	06	04	*	aqueous liquid waste containing hazardous substances	n
05	06	05	*	oil shale semicoke	n
05	06	06	*	tarry waste from oil shake ('fuses')	n
05	06	99		wastes not otherwise specified	
05	**07**			**wastes from natural gas purification and transportation**	
05	07	01	*	wastes containing mercury	
05	07	02		wastes containing sulphur	
05	07	99		wastes not otherwise specified	
06				**WASTES FROM INORGANIC CHEMICAL PROCESSES**	
06	**01**			**wastes from the manufacture, formulation and supply (MFS) of acids**	**a**
06	01	01	*	sulphuric acid and sulphurous acid	
06	01	02	*	hydrochloric acid	
06	01	03	*	hydrofluoric acid	
06	01	04	*	phosphoric and phosphorous acid	
06	01	05	*	nitric acid and nitrous acid	
06	01	06	*	other acids	
06	01	99		wastes not otherwise specified	
06	**02**			**wastes from the MFS of bases**	**a**
06	02	01	*	calcium hydroxide	
06	02	03	*	ammonium hydroxide	

06	02	04	*	sodium and potassium hydroxide	
06	02	05	*	other bases	
06	02	99		wastes not otherwise specified	
06	**03**			**wastes from the MFS of salts and their solutions and metallic oxides**	a
06	03	11	*	solid salts containing cyanides (deleted: "and solutions")	a
06	03	13	*	solid salts containing heavy metals (deleted: "and solutions")	a
06	03	14		solid salts other than those mentioned in 06 03 11 and 06 03 13 (deleted: "and solutions")	a
06	03	15	*	metallic oxides containing heavy metals	
06	03	16		metallic oxides other than those mentioned in 06 03 15	
06	03	17	*	salt solutions containing cyanides	n
06	03	18	*	salt solutions containing heavy metals	n
06	03	19		salt solutions other than those mentioned in 06 03 17 and 06 03 18	n
06	03	20	*	salt sludge containing cyanides	n
06	03	21	*	salt sludge containing heavy metals	n
06	03	22		salt sludge other than those mentioned in 06 03 20 and 06 03 21	n
06	03	99		wastes not otherwise specified	
06	**04**			**heavy metal containing wastes other than those mentioned in 06 03**	a
06	04	03	*	wastes containing arsenic	
06	04	04	*	wastes containing mercury	
06	04	05	*	wastes containing other heavy metals	
06	04	99		wastes not otherwise specified	
06	**06**			**wastes from the MFS of sulphur chemicals, sulphur chemical processes and desulphurisation processes**	a
06	06	02	*	wastes containing dangerous sulphides	
06	06	03		wastes containing sulphides other than those mentioned in 06 06 02	
06	06	99		wastes not otherwise specified	
06	**07**			**wastes from the MFS of halogens and halogen chemical processes**	a
06	07	01	*	wastes containing asbestos from electrolysis	
06	07	02	*	activated carbon from chlorine production	
06	07	03	*	barium sulphate sludge containing mercury	
06	07	04	*	solutions and acids, for example contact acid	
06	07	99		wastes not otherwise specified	
06	**08**			**wastes from the MFS of silicon and silicon derivatives**	a
06	08	02	*	waste containing dangerous silicones	
06	08	99		wastes not otherwise specified	
06	**09**			**wastes from the MFS of phosphorous chemicals and phosphorous chemical processes**	a
06	09	02		phosphorous slag	
06	09	03	*	calcium-based reaction wastes containing or contaminated with dangerous substances	
06	09	04		calcium-based reaction wastes other than those mentioned in 06 09 03	
06	09	99		wastes not otherwise specified	
06	**10**			**wastes from the MFS of nitrogen chemicals, nitrogen chemical processes and fertiliser manufacture**	a
06	10	02	*	wastes containing dangerous substances	
06	10	99		wastes not otherwise specified	
06	**11**			**wastes from the manufacture of inorganic pigments and opacificiers**	
06	11	01		calcium-based reaction wastes from titanium dioxide production	
06	11	99		wastes not otherwise specified	
16	**08**			**spent catalysts from inorganic chemical processes**	n
16	08	01		spent catalysts containing gold, silver, rhenium, rhodium, palladium, iridium or platinum (except 16 08 07)	n
16	08	02	*	spent catalysts containing dangerous transition metals (3) or dangerous transition metal compounds	n
16	08	03		spent catalysts containing transition metals or transition metal compounds not otherwise specified	n
16	08	04		spent fluid catalytic cracking catalysts (except 16 08 07)	n

16	08	05	*	spent catalysts containing phosphoric acid	n
16	08	06	*	spent liquids used as catalysts	n
16	08	07	*	spent catalysts contaminated with dangerous substances	n
16	**03**			**off-specification batches and unused products**	n
16	03	03	*	inorganic wastes containing dangerous substances	n
16	03	04		inorganic wastes other than those mentioned in 16 03 03	n
16	03	05	*	organic wastes containing dangerous substances	n
16	03	06		organic wastes other than those mentioned in 16 03 05	n
06	**13**			**wastes from inorganic chemical processes not otherwise specified**	
06	13	01	*	inorganic plant protection products, wood-preserving agents and other biocides.	
06	13	02	*	spent activated carbon (except 06 07 02)	
06	13	03		carbon black	
06	13	04	*	wastes from asbestos processing	
06	13	05	*	soot	
16	09	01	*	permanganates, for example potassium permanganate	
16	09	02	*	chromates, for example potassium chromate, potassium or sodium dichromate	
16	09	03	*	peroxides, for example hydrogen peroxide	
16	09	04	*	oxidising substances, not otherwise specified	
06	13	99		wastes not otherwise specified	
07				**WASTES FROM MANUFACTUR, FORMULATION AND SUPPLY (MFS) OF PRODUCTS FROM ORGANIC CHEMICAL PROCESSES**	a
07	**01**			**wastes from the MFS of basic organic chemicals**	a
07	01	01	*	aqueous washing liquids and mother liquors	
07	01	03	*	organic halogenated solvents, washing liquids and mother liquors	
07	01	04	*	other organic solvents, washing liquids and mother liquors	
07	01	07	*	halogenated still bottoms and reaction residues	
07	01	08	*	other still bottoms and reaction residues	
07	01	09	*	halogenated filter cakes and spent absorbents	
07	01	10	*	other filter cakes and spent absorbents	
07	01	99		wastes not otherwise specified	
07	**02**			**wastes from the MFS of plastics, synthetic rubber and man-made fibres**	a
07	02	01	*	aqueous washing liquids and mother liquors	
07	02	03	*	organic halogenated solvents, washing liquids and mother liquors	
07	02	04	*	other organic solvents, washing liquids and mother liquors	
07	02	07	*	halogenated still bottoms and reaction residues	
07	02	08	*	other still bottoms and reaction residues	
07	02	09	*	halogenated filter cakes and spent absorbents	
07	02	10	*	other filter cakes and spent absorbents	
07	02	13		waste plastic	
07	02	14	*	wastes from additives containing dangerous substances	
07	02	15		wastes from additives other than those mentioned in 07 02 14	
07	02	16	*	waste containing dangerous silicones	
07	02	17		waste containing silicones other than those mentioned in 07 02 16	
07	02	18		waste rubber	n
07	02	99		wastes not otherwise specified	
07	**03**			**wastes from the MFS of organic dyes and pigments (except 06 11)**	a
07	03	01	*	aqueous washing liquids and mother liquors	
07	03	03	*	organic halogenated solvents, washing liquids and mother liquors	
07	03	04	*	other organic solvents, washing liquids and mother liquors	
07	03	07	*	halogenated still bottoms and reaction residues	
07	03	08	*	other still bottoms and reaction residues	

07	03	09	*	halogenated filter cakes and spent absorbents	
07	03	10	*	other filter cakes and spent absorbents	
07	03	99		wastes not otherwise specified	
07	**04**			**wastes from the MFS of organic plant protection products (except 02 0108 and 02 01 09), wood preserving agents (except 03 02) and other biocides**	a
07	04	01	*	aqueous washing liquids and mother liquors	
07	04	03	*	organic halogenated solvents, washing liquids and mother liquors	
07	04	04	*	other organic solvents, washing liquids and mother liquors	
07	04	07	*	halogenated still bottoms and reaction residues	
07	04	08	*	other still bottoms and reaction residues	
07	04	09	*	halogenated filter cakes and spent absorbents	
07	04	10	*	other filter cakes and spent absorbents	
07	04	13	*	solid wastes containing dangerous substances	
07	04	14	*	Liquid wastes containing hazardous substances	n
07	04	15	*	off specification products and other unusable products containing dangerous substances	n
07	04	16		off specification products and other unusable products other than those mentioned in 07 04 15	n
07	04	99		wastes not otherwise specified	
07	**05**			**wastes from the MFS of pharmaceuticals**	a
07	05	01	*	aqueous washing liquids and mother liquors	
07	05	03	*	organic halogenated solvents, washing liquids and mother liquors	
07	05	04	*	other organic solvents, washing liquids and mother liquors	
07	05	07	*	halogenated still bottoms and reaction residues	
07	05	08	*	other still bottoms and reaction residues	
07	05	09	*	halogenated filter cakes and spent absorbents	
07	05	10	*	other filter cakes and spent absorbents	
07	05	13	*	solid wastes containing dangerous substances	
07	05	14		solid wastes other than those mentioned in 07 05 13	
07	05	15	*	Liquid wastes containing hazardous substances	n
07	05	16	*	off specification products and other unusable products containing dangerous substances	n
07	05	17		off specification products and other unusable products other than those mentioned in 07 04 15	n
07	05	18		Waste mycelium (fungus) from the production of pharmaceuticals	n
07	05	99		wastes not otherwise specified	
07	**06**			**wastes from the MFS of fats, grease, soaps, detergents, disinfectants and cosmetics**	a
07	06	01	*	aqueous washing liquids and mother liquors	
07	06	03	*	organic halogenated solvents, washing liquids and mother liquors	
07	06	04	*	other organic solvents, washing liquids and mother liquors	
07	06	07	*	halogenated still bottoms and reaction residues	
07	06	08	*	other still bottoms and reaction residues	
07	06	09	*	halogenated filter cakes and spent absorbents	
07	06	10	*	other filter cakes and spent absorbents	
07	06	13	*	Liquid wastes containing hazardous substances	n
07	06	14		Expired or unsuable products	n
07	06	99		wastes not otherwise specified	
16	**08**			**spent catalysts**	
16	08	01		spent catalysts containing gold, silver, rhenium, rhodium, palladium, iridium or platinum (except 16 08 07)	
16	08	02	*	spent catalysts containing dangerous transition metals (3) or dangerous transition metal compounds	
16	08	03		spent catalysts containing transition metals or transition metal compounds not otherwise specified	
16	08	04		spent fluid catalytic cracking catalysts (except 16 08 07)	
16	08	05	*	spent catalysts containing phosphoric acid	
16	08	06	*	spent liquids used as catalysts	
16	08	07	*	spent catalysts contaminated with dangerous substances	

16	**03**			**off-specification batches and unused products**	
16	03	03	*	inorganic wastes containing dangerous substances	
16	03	04		inorganic wastes other than those mentioned in 16 03 03	
16	03	05	*	organic wastes containing dangerous substances	
16	03	06		organic wastes other than those mentioned in 16 03 05	
07	**07**			**wastes from the MFSU of fine chemicals and chemical products not otherwise specified**	
07	07	01	*	aqueous washing liquids and mother liquors	
07	07	03	*	organic halogenated solvents, washing liquids and mother liquors	
07	07	04	*	other organic solvents, washing liquids and mother liquors	
07	07	07	*	halogenated still bottoms and reaction residues	
07	07	08	*	other still bottoms and reaction residues	
07	07	09	*	halogenated filter cakes and spent absorbents	
07	07	10	*	other filter cakes and spent absorbents	
07	07	99		wastes not otherwise specified	
08				**WASTES FROM THE MANUFACTURE, FORMULATION AND SUPPLY (MFS) OF COATINGS (PAINTS, VARNISHES AND VITREOUS ENAMELS), ADHESIVES, SEALANTS AND PRINTING INKS**	
08	**01**			**wastes from MFS and removal of paint and varnish**	
08	01	11	*	waste paint and varnish containing organic solvents or other dangerous substances	
08	01	12		waste paint and varnish other than those mentioned in 08 01 11	
08	01	13	*	sludges from paint or varnish containing organic solvents or other dangerous substances	
08	01	14		sludges from paint or varnish other than those mentioned in 08 01 13	
08	01	15	*	aqueous sludges containing paint or varnish containing organic solvents or other dangerous substances	
08	01	16		aqueous sludges containing paint or varnish other than those mentioned in 08 01 15	
08	01	17	*	wastes from paint or varnish removal containing organic solvents or other dangerous substances	
08	01	18		wastes from paint or varnish removal other than those mentioned in 08 01 17	
08	01	19	*	aqueous suspensions containing paint or varnish containing organic solvents or other dangerous substances	
08	01	20		aqueous suspensions containing paint or varnish other than those mentioned in 08 01 19	
08	01	21	*	waste paint or varnish remover	
08	01	99		wastes not otherwise specified	
08	**02**			**wastes from MFS of other coatings (including ceramic materials)**	
08	02	01		waste coating powders	
08	02	02		aqueous sludges containing ceramic materials	
08	02	03		aqueous suspensions containing ceramic materials	
08	02	04	*	hazardous waste from MFSU of other coatings (including ceramic materials)	n
08	02	99		wastes not otherwise specified	
08	**03**			**wastes from MFS of printing inks**	
08	03	07		aqueous sludges containing ink	
08	03	08		aqueous liquid waste containing ink	
08	03	09	*	aqueous liquid waste containing ink and dangerous substances	
08	03	12	*	waste ink containing dangerous substances	
08	03	13		waste ink other than those mentioned in 08 03 12	
08	03	14	*	ink sludges containing dangerous substances	
08	03	15		ink sludges other than those mentioned in 08 03 14	
08	03	16	*	waste etching solutions	
08	03	17	*	waste printing toner containing dangerous substances	
08	03	18		waste printing toner other than those mentioned in 08 03 17	
08	03	19	*	disperse oil	
08	03	99		wastes not otherwise specified	
08	**04**			**wastes from MFS of adhesives and sealants (including waterproofing products)**	
08	04	09	*	waste adhesives and sealants containing organic solvents or other dangerous substances	
08	04	10		waste adhesives and sealants other than those mentioned in 08 04 09	

08	04	17	*	rosin oil	
08	04	99		wastes not otherwise specified	
08	**05**			**wastes not otherwise specified in 08**	
08	05	01	*	waste isocyanates	
08	05	02	*	Filtering materials containing hazardous substances	
08	05	03		Filtering materials, other than those of heading 08 05 02*	
09				**WASTES FROM THE PHOTOGRAPHIC INDUSTRY**	
09	**01**			**wastes from the photographic industry**	
09	01	01	*	water-based developer and activator solutions	
09	01	02	*	water-based offset plate developer solutions	
09	01	03	*	solvent-based developer solutions	
09	01	04	*	fixer solutions	
09	01	05	*	bleach solutions and bleach fixer solutions	
09	01	07		photographic film and paper containing silver or silver compounds	
09	01	08		photographic film and paper free of silver or silver compounds	
09	01	10		single-use cameras without batteries	d
09	01	11	*	single-use cameras containing batteries included in 16 06 01, 16 06 02 or 16 06 03	d
09	01	12		single-use cameras containing batteries other than those mentioned in 09 01 11	d
09	01	14		mixed waste from developer and fixer of the photographic industry	n
09	01	99		wastes not otherwise specified	
10				**WASTES FROM THERMAL PROCESSES**	
10	**01**			**wastes from power stations and other combustion plants (except 19)**	
10	01	25		wastes from fuel storage and preparation of coal-fired power plants	
10	01	27		wastes from fuel storage and preparation of oil shale-fired power plants	n
10	01	99		wastes not otherwise specified	
10	**02**			**wastes from the iron and steel industry**	
10	02	01		wastes from the processing of slag	
10	02	02		unprocessed slag	
10	02	10		mill scales	
10	02	99		wastes not otherwise specified	
10	**03**			**wastes from aluminium thermal metallurgy**	
10	03	02		anode scraps	
10	03	04	*	primary production slags	
10	03	05		waste alumina	
10	03	08	*	salt slags from secondary production	
10	03	09	*	black drosses from secondary production	
10	03	15	*	skimmings that are flammable or emit, upon contact with water, flammable gases in dangerous quantities	
10	03	16		skimmings other than those mentioned in 10 03 15	
10	03	17	*	tar-containing wastes from anode manufacture	
10	03	18		carbon-containing wastes from anode manufacture other than those mentioned in 10 03 17	
10	03	21	*	other particulates and dust (including ball-mill dust) containing dangerous substances	
10	03	22		other particulates and dust (including ball-mill dust) other than those mentioned in 10 03 21	
10	03	29	*	wastes from treatment of salt slags and black drosses containing dangerous substances	
10	03	30		wastes from treatment of salt slags and black drosses other than those mentioned in 10 03 29	
10	03	99		wastes not otherwise specified	
10	**04**			**wastes from lead thermal metallurgy**	
10	04	01	*	slags from primary and secondary production	
10	04	02	*	dross and skimmings from primary and secondary production	
10	04	03	*	calcium arsenate	
10	04	05	*	particulates and dust other than flue gas dust	

10	04	99		wastes not otherwise specified
10	**05**			**wastes from zinc thermal metallurgy**
10	05	01		slags from primary and secondary production
10	05	10	*	dross and skimmings that are flammable or emit, upon contact with water, flammable gases in dangerous quantities
10	05	11		dross and skimmings other than those mentioned in 10 05 10
10	05	99		wastes not otherwise specified
10	**06**			**wastes from copper thermal metallurgy**
10	06	01		slags from primary and secondary production
10	06	02		dross and skimmings from primary and secondary production
10	06	04		particulates and dust other than flue gas dust
10	06	99		wastes not otherwise specified
10	**07**			**wastes from silver, gold and platinum thermal metallurgy**
10	07	01		slags from primary and secondary production
10	07	02		dross and skimmings from primary and secondary production
10	07	04		particulates and dust other than flue gas dust and particulate from flue gas cleaning
10	07	99		wastes not otherwise specified
10	**08**			**wastes from other non-ferrous thermal metallurgy**
10	08	04		particulates and dust
10	08	08	*	salt slag from primary and secondary production
10	08	09		other slags
10	08	10	*	dross and skimmings that are flammable or emit, upon contact with water, flammable gases in dangerous quantities
10	08	11		dross and skimmings other than those mentioned in 10 08 10
10	08	12	*	tar-containing wastes from anode manufacture
10	08	13		carbon-containing wastes from anode manufacture other than those mentioned in 10 08 12
10	08	14		anode scrap
10	08	99		wastes not otherwise specified
10	**09**			**wastes from casting of ferrous pieces**
10	09	03		furnace slag
10	09	05	*	casting cores and moulds which have not undergone pouring containing dangerous substances
10	09	06		casting cores and moulds which have not undergone pouring other than those mentioned in 10 09 05
10	09	07	*	casting cores and moulds which have undergone pouring containing dangerous substances
10	09	08		casting cores and moulds which have undergone pouring other than those mentioned in 10 09 07
10	09	13	*	waste binders containing dangerous substances
10	09	14		waste binders other than those mentioned in 10 09 13
10	09	15	*	waste crack-indicating agent containing dangerous substances
10	09	16		waste crack-indicating agent other than those mentioned in 10 09 15
10	09	99		wastes not otherwise specified
10	**10**			**wastes from casting of non-ferrous pieces**
10	10	03		furnace slag
10	10	05	*	casting cores and moulds which have not undergone pouring, containing dangerous substances
10	10	06		casting cores and moulds which have not undergone pouring, other than those mentioned in 10 10 05
10	10	07	*	casting cores and moulds which have undergone pouring, containing dangerous substances
10	10	08		casting cores and moulds which have undergone pouring, other than those mentioned in 10 10 07
10	10	13	*	waste binders containing dangerous substances
10	10	14		waste binders other than those mentioned in 10 10 13
10	10	15	*	waste crack-indicating agent containing dangerous substances
10	10	16		waste crack-indicating agent other than those mentioned in 10 10 15
10	10	99		wastes not otherwise specified
10	**11**			**wastes from manufacture of glass and glass products**
10	11	03		waste glass-based fibrous materials

10	11	05		particulates and dust	
10	11	09	*	waste preparation mixture before thermal processing, containing dangerous substances	
10	11	10		waste preparation mixture before thermal processing, other than those mentioned in 10 11 09	
10	11	11	*	waste glass in small particles and glass powder containing heavy metals (for example from cathode ray tubes)	
10	11	12		waste glass other than those mentioned in 10 11 11	
10	11	13	*	glass-polishing and -grinding sludge containing dangerous substances	
10	11	14		glass-polishing and -grinding sludge other than those mentioned in 10 11 13	
10	11	99		wastes not otherwise specified	
10	**12**			**wastes from manufacture of ceramic goods, bricks, tiles and construction products**	
10	12	01		waste preparation mixture before thermal processing	
10	12	03		particulates and dust	
10	12	06		discarded moulds	
10	12	08		waste ceramics, bricks, tiles and construction products (after thermal processing)	
10	12	11	*	wastes from glazing containing heavy metals	
10	12	12		wastes from glazing other than those mentioned in 10 12 11	
10	12	99		wastes not otherwise specified	
10	**13**			**wastes from manufacture of cement, lime and plaster and articles and products made from them**	
10	13	01		waste preparation mixture before thermal processing	
10	13	04		wastes from calcination and hydration of lime	
10	13	06		particulates and dust (except 10 13 12 and 10 13 13)	
10	13	07		sludges and filter cakes from gas treatment	
10	13	09	*	wastes from asbestos-cement manufacture containing asbestos	d
10	13	10		wastes from asbestos-cement manufacture other than those mentioned in 10 13 09	d
10	13	11		wastes from cement-based composite materials other than those mentioned in 10 13 09 and 10 13 10	
10	13	14		waste concrete and concrete sludge	
10	13	99		wastes not otherwise specified	
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	
11	01	06	*	acids not otherwise specified	
11	01	07	*	pickling bases	
11	01	08	*	phosphatising sludges	
11	01	09	*	sludges and filter cakes containing dangerous substances	
11	01	10		sludges and filter cakes other than those mentioned in 11 01 09	
11	01	11	*	aqueous rinsing liquids containing dangerous substances	
11	01	12		aqueous rinsing liquids other than those mentioned in 11 01 11	
11	01	13	*	degreasing wastes containing dangerous substances	
11	01	14		degreasing wastes other than those mentioned in 11 01 13	
11	01	15	*	eluate and sludges from membrane systems or ion exchange systems containing dangerous substances	
11	01	16	*	saturated or spent ion exchange resins	
11	01	17	*	Exhausted concentrated electrolytic baths	n
11	01	98	*	other wastes containing dangerous substances	
11	01	99		wastes not otherwise specified	
11	**02**			**wastes from non-ferrous hydrometallurgical processes**	
11	02	02	*	sludges from zinc hydrometallurgy (including jarosite, goethite)	
11	02	03		wastes from the production of anodes for aqueous electrolytical processes	
11	02	05	*	wastes from copper hydrometallurgical processes containing dangerous substances	
11	02	06		wastes from copper hydrometallurgical processes other than those mentioned in 11 02 05	

11	02	07	*	other wastes containing dangerous substances	
11	02	99		wastes not otherwise specified	
11	**03**			**sludges and solids from tempering processes**	
11	03	01	*	wastes containing cyanide	
11	03	02	*	other wastes	
11	**05**			**wastes from hot galvanising processes**	
11	05	01		hard zinc	
11	05	02		zinc ash	
11	05	04	*	spent flux	
11	05	99		wastes not otherwise specified	
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	
12	01	02		ferrous metal dust and particles	
12	01	03		non-ferrous metal filings and turnings	
12	01	04		non-ferrous metal dust and particles	
12	01	05		plastics shavings and turnings	
12	01	06	*	mineral-based machining oils containing halogens (except emulsions and solutions)	
12	01	07	*	mineral-based machining oils free of halogens (except emulsions and solutions)	
12	01	08	*	machining emulsions and solutions containing halogens	
12	01	09	*	machining emulsions and solutions free of halogens	
12	01	10	*	synthetic machining oils	
12	01	12	*	spent waxes and fats	
12	01	13		welding wastes	
12	01	14	*	machining sludges containing dangerous substances	
12	01	15		machining sludges other than those mentioned in 12 01 14	
12	01	16	*	waste blasting material containing dangerous substances	
12	01	17		waste blasting material other than those mentioned in 12 01 16	
12	01	18	*	metal sludge (grinding, honing and lapping sludge) containing oil	
12	01	19	*	readily biodegradable machining oil	
12	01	20	*	spent grinding bodies and grinding materials containing dangerous substances	
12	01	21		spent grinding bodies and grinding materials other than those mentioned in 12 01 20	
12	01	22	*	ferrous metal filings and turnings other than 12 01 01 containing dangerous subtstances	n
12	01	23	*	ferrous metal dust and particles other than 12 01 02 containing dangerous subtstances	n
12	01	24	*	non-ferrous metal filings and turnings other than 12 01 03 containing dangerous subtstances	n
12	01	25	*	non-ferrous metal dust and particles other than 12 01 04 containing dangerous subtstances	n
12	01	26	*	plastics shavings and turnings other than 12 01 05 containing dangerous subtstances	n
12	01	27		metal sludge (grinding, honing and lapping sludge) others than 12 01 18	n
12	01	28		12 01 22 Waste and scrap of ferrous materials	
12	01	29		12 01 23 Waste and scrap of non-ferrous materials	
12	01	30		waste plastics wastes from shaping and physical and mechanical surface treatment	n
12	01	31		waste rubber from shaping and physical and mechanical surface treatment	n
12	01	99		wastes not otherwise specified	
12	**03**			**wastes from water and steam degreasing processes (except 11)**	
12	03	01	*	aqueous washing liquids	
12	03	02	*	steam degreasing wastes	
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 (1)	
13	01	04	*	chlorinated emulsions	

13	01	05	*	non-chlorinated emulsions	
13	01	09	*	mineral-based chlorinated hydraulic oils	
13	01	10	*	mineral based non-chlorinated hydraulic oils	
13	01	11	*	synthetic hydraulic oils	
13	01	12	*	readily biodegradable hydraulic oils	
13	01	13	*	other hydraulic oils	
13	**02**			**waste engine, gear and lubricating oils**	
13	02	04	*	mineral-based chlorinated engine, gear and lubricating oils and fat	a
13	02	05	*	mineral-based non-chlorinated engine, gear and lubricating oils and fat	a
13	02	06	*	synthetic engine, gear and lubricating oils and fat	a
13	02	07	*	readily biodegradable engine, gear and lubricating oils	
13	02	08	*	other engine, gear and lubricating oils and fat	a
13	**03**			**waste insulating and heat transmission oils**	
13	03	01	*	insulating or heat transmission oils containing PCBs	
13	03	06	*	mineral-based chlorinated insulating and heat transmission oils other than those mentioned in 13 03 01	
13	03	07	*	mineral-based non-chlorinated insulating and heat transmission oils	
13	03	08	*	synthetic insulating and heat transmission oils	
13	03	09	*	readily biodegradable insulating and heat transmission oils	
13	03	10	*	other insulating and heat transmission oils	
13	**04**			**bilge oils**	
13	04	01	*	bilge oils from inland navigation	
13	04	02	*	bilge oils from jetty sewers	
13	04	03	*	bilge oils from other navigation	
13	**05**			**oil/water separator contents**	
13	05	01	*	solids from grit chambers and oil/water separators	
13	05	02	*	sludges from oil/water separators	
13	05	03	*	interceptor sludges	
13	05	06	*	oil from oil/water separators	
13	05	07	*	oily water from oil/water separators	
13	05	08	*	mixtures of wastes from grit chambers and oil/water separators	
13	**07**			**wastes of liquid fuels**	
13	07	01	*	fuel oil and diesel	
13	07	02	*	petrol	
13	07	03	*	other fuels (including mixtures)	
13	**08**			**wastes not otherwise specified**	
13	08	01	*	desalter sludges or emulsions	
13	08	02	*	other emulsions	
13	08	99	*	wastes not otherwise specified	
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	
14	06	02	*	other halogenated solvents and solvent mixtures	
14	06	03	*	other solvents and solvent mixtures	
14	06	04	*	sludges or solid wastes containing halogenated solvents	
14	06	05	*	sludges or solid wastes containing other solvents	
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	
15	01	02		plastic packaging	
15	01	03		wooden packaging	

15	01	04		metallic packaging
15	01	05		composite packaging
15	01	06		mixed packaging
15	01	07		glass packaging
15	01	09		textile packaging
15	01	10	*	packaging containing residues of or contaminated by dangerous substances
15	01	11	*	metallic packaging containing a dangerous solid porous matrix (for example asbestos), including empty pressure containers
15	**02**			**absorbents, filter materials, wiping cloths and protective clothing**
15	02	02	*	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances
15	02	03		absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02
16	**05**			**discarded chemicals**
16	05	06	*	laboratory chemicals, consisting of or containing dangerous substances, including mixtures of laboratory chemicals
16	05	09		laboratory chemicals other than those mentioned in 16 05 06
99				**Waste from off gas treatment and waste water treatment**
06	**05**			**sludges from on-site effluent treatment**
06	05	02	*	sludges from on-site effluent treatment containing dangerous substances
06	05	03		sludges from on-site effluent treatment other than those mentioned in 06 05 02
02	03	05		sludges from on-site effluent treatment
02	04	03		sludges from on-site effluent treatment
02	03	05		sludges from on-site effluent treatment
02	04	03		sludges from on-site effluent treatment
02	05	02		sludges from on-site effluent treatment
02	06	03		sludges from on-site effluent treatment
02	07	05		sludges from on-site effluent treatment
03	03	10		fibre rejects, fibre-, filler- and coating-sludges from mechanical separation
03	03	11		sludges from on-site effluent treatment other than those mentioned in 03 03 10
04	01	06		sludges, in particular from on-site effluent treatment containing chromium
04	01	07		sludges, in particular from on-site effluent treatment free of chromium
04	02	19	*	sludges from on-site effluent treatment containing dangerous substances
04	02	20		sludges from on-site effluent treatment other than those mentioned in 04 02 19
05	01	09	*	sludges from on-site effluent treatment containing dangerous substances
05	01	10		sludges from on-site effluent treatment other than those mentioned in 05 01 09
06	05	02	*	sludges from on-site effluent treatment containing dangerous substances
06	05	03		sludges from on-site effluent treatment other than those mentioned in 06 05 02
07	01	11	*	sludges from on-site effluent treatment containing dangerous substances
07	01	12		sludges from on-site effluent treatment other than those mentioned in 07 01 11
07	02	11	*	sludges from on-site effluent treatment containing dangerous substances
07	02	12		sludges from on-site effluent treatment other than those mentioned in 07 02 11
07	03	11	*	sludges from on-site effluent treatment containing dangerous substances
07	03	12		sludges from on-site effluent treatment other than those mentioned in 07 03 11
07	04	11	*	sludges from on-site effluent treatment containing dangerous substances
07	04	12		sludges from on-site effluent treatment other than those mentioned in 07 04 11
07	05	11	*	sludges from on-site effluent treatment containing dangerous substances
07	05	12		sludges from on-site effluent treatment other than those mentioned in 07 05 11
07	06	11	*	sludges from on-site effluent treatment containing dangerous substances
07	06	12		sludges from on-site effluent treatment other than those mentioned in 07 06 11
07	07	11	*	sludges from on-site effluent treatment containing dangerous substances
07	07	12		sludges from on-site effluent treatment other than those mentioned in 07 07 11
08	04	11	*	adhesive and sealant sludges containing organic solvents or other dangerous substances

08	04	12		adhesive and sealant sludges other than those mentioned in 08 04 11	
08	04	13	*	aqueous sludges containing adhesives or sealants containing organic solvents or other dangerous substances	
08	04	14		aqueous sludges containing adhesives or sealants other than those mentioned in 08 04 13	
08	04	15	*	aqueous liquid waste containing adhesives or sealants containing organic solvents or other dangerous substances	
08	04	16		aqueous liquid waste containing adhesives or sealants other than those mentioned in 08 04 15	
09	01	06	*	wastes containing silver from on-site treatment of photographic wastes	
09	01	13	*	aqueous liquid waste from on-site reclamation of silver other than those mentioned in 09 01 06	
10	**01**			**waste from off gas treatment**	n
10	01	02		coal fly ash	
10	01	03		fly ash from peat and untreated wood	
10	01	04	*	oil fly ash and boiler dust	
10	01	05		calcium-based reaction wastes from flue-gas desulphurisation in solid form	
10	01	07		calcium-based reaction wastes from flue-gas desulphurisation in sludge form	
10	01	09	*	sulphuric acid	
10	01	13	*	fly ash from emulsified hydrocarbons used as fuel	
10	01	16	*	fly ash from co-incineration containing dangerous substances	
10	01	17		fly ash from co-incineration other than those mentioned in 10 01 16	
10	01	19		wastes from gas cleaning other than those mentioned in 10 01 05, 10 01 07 and 10 01 18	
10	01	20	*	sludges from on-site effluent treatment containing dangerous substances	
10	01	21		sludges from on-site effluent treatment other than those mentioned in 10 01 20	
10	01	22	*	aqueous sludges from boiler cleansing containing dangerous substances	
10	01	23		aqueous sludges from boiler cleansing other than those mentioned in 10 01 22	
10	01	26		wastes from cooling-water treatment	
10	02	07	*	solid wastes from gas treatment containing dangerous substances	
10	02	08		solid wastes from gas treatment other than those mentioned in 10 02 07	
10	02	11	*	wastes from cooling-water treatment containing oil	
10	02	12		wastes from cooling-water treatment other than those mentioned in 10 02 11	
10	02	13	*	sludges and filter cakes from gas treatment containing dangerous substances	
10	02	14		sludges and filter cakes from gas treatment other than those mentioned in 10 02 13	
10	02	15		other sludges and filter cakes	
10	03	19	*	flue-gas dust containing dangerous substances	
10	03	20		flue-gas dust other than those mentioned in 10 03 19	
10	03	21	*	other particulates and dust (including ball-mill dust) containing dangerous substances	
10	03	22		other particulates and dust (including ball-mill dust) other than those mentioned in 10 03 21	
10	03	23	*	solid wastes from gas treatment containing dangerous substances	
10	03	24		solid wastes from gas treatment other than those mentioned in 10 03 23	
10	03	25	*	sludges and filter cakes from gas treatment containing dangerous substances	
10	03	26		sludges and filter cakes from gas treatment other than those mentioned in 10 03 25	
10	03	27	*	wastes from cooling-water treatment containing oil	
10	03	28		wastes from cooling-water treatment other than those mentioned in 10 03 27	
10	04	04	*	flue-gas dust	
10	04	05	*	other particulates and dust	
10	04	06	*	solid wastes from gas treatment	
10	04	07	*	sludges and filter cakes from gas treatment	
10	04	09	*	wastes from cooling-water treatment containing oil	
10	04	10		wastes from cooling-water treatment other than those mentioned in 10 04 09	
10	05	03	*	flue-gas dust	
10	05	04		other particulates and dust	
10	05	05	*	solid waste from gas treatment	
10	05	06	*	sludges and filter cakes from gas treatment	

10	05	08	*	wastes from cooling-water treatment containing oil
10	05	09		wastes from cooling-water treatment other than those mentioned in 10 05 08
10	06	03	*	flue-gas dust
10	06	04		other particulates and dust
10	06	06	*	solid wastes from gas treatment
10	06	07	*	sludges and filter cakes from gas treatment
10	06	09	*	wastes from cooling-water treatment containing oil
10	06	10		wastes from cooling-water treatment other than those mentioned in 10 06 09
10	07	03		solid wastes from gas treatment
10	07	04		other particulates and dust
10	07	05		sludges and filter cakes from gas treatment
10	07	07	*	wastes from cooling-water treatment containing oil
10	07	08		wastes from cooling-water treatment other than those mentioned in 10 07 07
10	08	04		particulates and dust
10	08	15	*	flue-gas dust containing dangerous substances
10	08	16		flue-gas dust other than those mentioned in 10 08 15
10	08	17	*	sludges and filter cakes from flue-gas treatment containing dangerous substances
10	08	18		sludges and filter cakes from flue-gas treatment other than those mentioned in 10 08 17
10	08	19	*	wastes from cooling-water treatment containing oil
10	08	20		wastes from cooling-water treatment other than those mentioned in 10 08 19
10	09	09	*	flue-gas dust containing dangerous substances
10	09	10		flue-gas dust other than those mentioned in 10 09 09
10	09	11	*	other particulates containing dangerous substances
10	09	12		other particulates other than those mentioned in 10 09 11
10	10	09	*	flue-gas dust containing dangerous substances
10	10	10		flue-gas dust other than those mentioned in 10 10 09
10	10	11	*	other particulates containing dangerous substances
10	10	12		other particulates other than those mentioned in 10 10 11
10	11	05		particulates and dust
10	11	15	*	solid wastes from flue-gas treatment containing dangerous substances
10	11	16		solid wastes from flue-gas treatment other than those mentioned in 10 11 15
10	11	17	*	sludges and filter cakes from flue-gas treatment containing dangerous substances
10	11	18		sludges and filter cakes from flue-gas treatment other than those mentioned in 10 11 17
10	11	19	*	solid wastes from on-site effluent treatment containing dangerous substances
10	11	20		solid wastes from on-site effluent treatment other than those mentioned in 10 11 19
10	12	03		particulates and dust
10	12	05		sludges and filter cakes from gas treatment
10	12	09	*	solid wastes from gas treatment containing dangerous substances
10	12	10		solid wastes from gas treatment other than those mentioned in 10 12 09
10	12	13		sludge from on-site effluent treatment
10	13	06		particulates and dust (except 10 13 12 and 10 13 13)
10	13	07		sludges and filter cakes from gas treatment
10	13	12	*	solid wastes from gas treatment containing dangerous substances
10	13	13		solid wastes from gas treatment other than those mentioned in 10 13 12
10	14	01	*	waste from gas cleaning containing mercury
11	05	03	*	solid wastes from gas treatment
12	03	01	*	aqueous washing liquids
12	03	02	*	steam degreasing wastes
19	01	05	*	filter cake from gas treatment
19	01	06	*	aqueous liquid wastes from gas treatment and other aqueous liquid wastes

19	01	07	*	solid wastes from gas treatment	
19	01	10	*	spent activated carbon from flue-gas treatment	
19	04	02	*	fly ash and other flue-gas treatment wastes	
19	11	05	*	sludges from on-site effluent treatment containing dangerous substances	
19	11	06		sludges from on-site effluent treatment other than those mentioned in 19 11 05	
19	11	07	*	wastes from flue-gas cleaning	
99	**99**			**Slags, ashes, linings**	**n**
06	09	02		phosphorous slag	
10	01	01		bottom ash, slag and boiler dust (excluding boiler dust mentioned in 10 01 04)	
10	01	02		coal fly ash	
10	01	03		fly ash from peat and untreated wood	
10	01	04	*	oil fly ash and boiler dust	
10	01	13	*	fly ash from emulsified hydrocarbons used as fuel	
10	01	14	*	bottom ash, slag and boiler dust from co-incineration containing dangerous substances	
10	01	15		bottom ash, slag and boiler dust from co-incineration other than those mentioned in 10 01 14	
10	01	16	*	fly ash from co-incineration containing dangerous substances	
10	01	17		fly ash from co-incineration other than those mentioned in 10 01 16	
10	02	02		unprocessed slag	
10	03	04	*	primary production slags	
10	03	08	*	salt slags from secondary production	
10	04	01	*	slags from primary and secondary production	
10	05	01		slags from primary and secondary production	
10	06	01		slags from primary and secondary production	
10	07	01		slags from primary and secondary production	
10	08	08	*	salt slag from primary and secondary production	
10	08	09		other slags	
10	09	03		furnace slag	
10	10	03		furnace slag	
19	01	11	*	bottom ash and slag containing dangerous substances	
19	01	12		bottom ash and slag other than those mentioned in 19 01 11	
19	01	13	*	fly ash containing dangerous substances	
19	01	14		fly ash other than those mentioned in 19 01 13	
19	01	15	*	boiler dust containing dangerous substances	
19	01	16		boiler dust other than those mentioned in 19 01 15	
19	04	02	*	fly ash and other flue-gas treatment wastes	
10	01	28	*	boiler dust from combustion of heavy fuel oil	
10	01	29	*	oil shale bottom ash and slag	
10	01	30	*	oil shale fly ash	
16	**11**			**waste linings and refractories**	
16	11	01	*	carbon-based linings and refractories from metallurgical processes containing dangerous substances	
16	11	02		carbon-based linings and refractories from metallurgical processes others than those mentioned in 16 11 01	
16	11	03	*	other linings and refractories from metallurgical processes containing dangerous substances	
16	11	04		other linings and refractories from metallurgical processes other than those mentioned in 16 11 03	
16	11	05	*	linings and refractories from non-metallurgical processes containing dangerous substances	
16	11	06		linings and refractories from non-metallurgical processes others than those mentioned in 16 11 05	
10	01	24		sands from fluidised beds	
19	01	19		sands from fluidised beds	
18				**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)	

18	01	02		body parts and organs including blood bags and blood preserves (except 18 01 03)	
18	01	03	*	wastes whose collection and disposal is subject to special requirements in order to prevent infection	
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)	
18	01	06	*	chemicals consisting of or containing dangerous substances	
18	01	07		chemicals other than those mentioned in 18 01 06	
18	01	08	*	cytotoxic and cytostatic medicines	
18	01	09		medicines other than those mentioned in 18 01 08	
18	01	10	*	amalgam waste from dental care	
18	01	11		used curative mud	n
18	01	12	*	antibiotics	n
18	01	13	*	Medicines with narcotic and psychotropic effect	n
18	01	14	*	medicines containing other dangerous active ingredients	n
18	01	15	*	unsorted batches of medicines	n
18	**02**			**wastes from research, diagnosis, treatment or prevention of disease involving animals**	
18	02	01		sharps (except 18 02 02)	
18	02	02	*	wastes whose collection and disposal is subject to special requirements in order to prevent infection	
18	02	03		wastes whose collection and disposal is not subject to special requirements in order to prevent infection	
18	02	05	*	chemicals consisting of or containing dangerous substances	
18	02	06		chemicals other than those mentioned in 18 02 05	
18	02	07	*	cytotoxic and cytostatic medicines	
18	02	08		medicines other than those mentioned in 18 02 07	
18	02	19	*	animal tissue	n
18	02	20	*	blood from veterinary practice	n
99	**99**			**Other wastes**	
16	10	01	*	aqueous liquid wastes containing dangerous substances	d
16	10	02		aqueous liquid wastes other than those mentioned in 16 10 01	d
16	10	03	*	aqueous concentrates containing dangerous substances	d
16	10	04		aqueous concentrates other than those mentioned in 16 10 03	d
99				**Part II Waste from waste management activities**	
19				**WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE**	
19	**01**			**wastes from incineration or pyrolysis of waste**	
19	01	02		ferrous materials removed from bottom ash	
19	01	17	*	pyrolysis wastes containing dangerous substances	
19	01	18		pyrolysis wastes other than those mentioned in 19 01 17	
19	01	99		wastes not otherwise specified	
19	**02**			**wastes from physico/chemical treatments of waste (including dechromatation, decyanidation, neutralisation)**	
19	02	03		premixed wastes composed only of non-hazardous wastes	
19	02	04	*	premixed wastes composed of at least one hazardous waste	
19	02	05	*	sludges from physico/chemical treatment containing dangerous substances	
19	02	06		sludges from physico/chemical treatment other than those mentioned in 19 02 05	
19	02	07	*	oil and concentrates from separation	
19	02	08	*	liquid combustible wastes containing dangerous substances	
19	02	09	*	solid combustible wastes containing dangerous substances	
19	02	10		combustible wastes other than those mentioned in 19 02 08 and 19 02 09	
19	02	11	*	other wastes containing dangerous substances	
19	02	12	*	liquid waste from physico/ chemical treatment	n
19	02	99		wastes not otherwise specified	
19	**03**			**stabilised/solidified wastes (4)**	

19	03	04	*	wastes marked as hazardous, partly (5) stabilised	
19	03	05		stabilised wastes other than those mentioned in 19 03 04	
19	03	06	*	wastes marked as hazardous, solidified	
19	03	07		solidified wastes other than those mentioned in 19 03 06	
19	**04**			**vitrified waste and wastes from vitrification**	
19	04	01		vitrified waste	
19	04	03	*	non-vitrified solid phase	
19	04	04		aqueous liquid wastes from vitrified waste tempering	
19	**05**			**wastes from aerobic treatment of solid wastes**	
19	05	01		non-composted fraction of municipal and similar wastes	
19	05	02		non-composted fraction of animal and vegetable waste	
19	05	03		off-specification compost	
19	05	04		stabilised biological waste from mechanical biological treament plants	n
19	05	05		waste from biofilters	n
19	05	06	*	Leachate treatment wastes containing hazardous substances	n
19	05	07		Leachate treatment waste, other than those mentioned in 19 05 06*	n
19	05	08	*	Waste from aerobic biological treatment of hazardous waste	n
19	05	99		wastes not otherwise specified	
19	**06**			**wastes from anaerobic treatment of waste**	
19	06	03		liquor from anaerobic treatment of municipal waste	
19	06	04		digestate from anaerobic treatment of municipal waste	
19	06	05		liquor from anaerobic treatment of animal and vegetable waste	
19	06	06		digestate from anaerobic treatment of animal and vegetable waste	
19	06	07		digestate from anaerobic treatment of other waste	n
19	06	99		wastes not otherwise specified	
19	**07**			**landfill leachate**	
19	07	02	*	landfill leachate containing dangerous substances	
19	07	03		landfill leachate other than those mentioned in 19 07 02	
19	**08**			**wastes from waste water treatment plants not otherwise specified**	
19	08	01		screenings	
19	08	02		waste from desanding	
19	08	05		sludges from treatment of urban waste water	
19	08	06	*	saturated or spent ion exchange resins	
19	08	07	*	solutions and sludges from regeneration of ion exchangers	
19	08	08	*	membrane system waste containing heavy metals	
19	08	09		grease and oil mixture from oil/water separation containing only edible oil and fats	
19	08	10	*	grease and oil mixture from oil/water separation other than those mentioned in 19 08 09	
19	08	11	*	sludges containing dangerous substances from biological treatment of industrial waste water	
19	08	12		sludges from biological treatment of industrial waste water other than those mentioned in 19 08 11	
19	08	13	*	sludges containing dangerous substances from other treatment of industrial waste water	
19	08	14		sludges from other treatment of industrial waste water other than those mentioned in 19 08 13	
19	08	15	*	Sorting residues	n
19	08	16		Sorting residues other than 19 08 15	n
19	08	99		wastes not otherwise specified	
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	
19	09	02		sludges from water clarification	
19	09	03		sludges from decarbonation	
19	09	04		spent activated carbon	
19	09	05		saturated or spent ion exchange resins	

19	09	06		solutions and sludges from regeneration of ion exchangers	
19	09	99		wastes not otherwise specified	
19	**10**			**wastes from shredding of metal-containing wastes**	
19	10	01		iron and steel waste	
19	10	02		non-ferrous waste	
19	10	03	*	fluff-light fraction and dust containing dangerous substances	
19	10	04		fluff-light fraction and dust other than those mentioned in 19 10 03	
19	10	05	*	other fractions containing dangerous substances	
19	10	06		other fractions other than those mentioned in 19 10 05	
19	**11**			**wastes from oil regeneration**	
19	11	01	*	spent filter clays	
19	11	02	*	acid tars	
19	11	03	*	aqueous liquid wastes	
19	11	04	*	wastes from cleaning of fuel with bases	
19	11	99		wastes not otherwise specified	
19	**12**			**wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified**	
19	12	01		paper and cardboard	
19	12	02		ferrous metal	
19	12	03		non-ferrous metal	
19	12	04		plastic and rubber	
19	12	05		glass	
19	12	06	*	wood containing dangerous substances	
19	12	07		wood other than that mentioned in 19 12 06	
19	12	08		textiles	
19	12	09		minerals (for example sand, stones)	
19	12	10		combustible waste (refuse derived fuel)	
19	12	11	*	other wastes (including mixtures of materials) from mechanical treatment of waste containing dangerous substances	
19	12	12		other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11	
19	**13**			**wastes from soil and groundwater remediation**	
19	13	01	*	solid wastes from soil remediation containing dangerous substances	
19	13	02		solid wastes from soil remediation other than those mentioned in 19 13 01	
19	13	03	*	sludges from soil remediation containing dangerous substances	
19	13	04		sludges from soil remediation other than those mentioned in 19 13 03	
19	13	05	*	sludges from groundwater remediation containing dangerous substances	
19	13	06		sludges from groundwater remediation other than those mentioned in 19 13 05	
19	13	07	*	aqueous liquid wastes and aqueous concentrates from groundwater remediation containing dangerous substances	
19	13	08		aqueous liquid wastes and aqueous concentrates from groundwater remediation other than those mentioned in 19 13 07	
19	13	09	*	Soil and rocks from contaminated sites containing hazardous substances	n
19	13	10		Soil and rocks from contaminated sites, other than those mentioned in 19 13 09*	n
19	13	11	*	River sediments, marine and lake containing hazardous substances	n
19	13	12		River sediments, marine and lake, other than those mentioned in 19 13 11*	n
17				**CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)**	
17	**01**			**concrete, bricks, tiles and ceramics**	
17	01	01		concrete	
17	01	02		bricks	
17	01	03		tiles and ceramics	
17	01	06	*	mixtures of, or separate fractions of concrete, bricks, tiles and ceramics containing dangerous substances	
17	01	07		mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06	
17	**02**			**wood, glass and plastic**	

17	02	01		wood	
17	02	02		glass	
17	02	03		plastic	
17	02	04	*	glass and/or plastic containing or contaminated with dangerous substances	a
17	02	05	*	wood containing or contaminated with dangerous substances	n
17	02	06		mixture of materials like glass, wood and plastic not mentioned in this section	n
17	**03**			**bituminous mixtures, coal tar, coal or oil shale tar and tarred products**	
17	03	01	*	bituminous mixtures containing coal tar or oil shale tar	
17	03	02		bituminous mixtures other than those mentioned in 17 03 01	
17	03	03	*	coal tar and oil shale tar and tarred products	
17	**04**			**metals (including their alloys)**	
17	04	01		copper, bronze, brass	
17	04	02		aluminium	
17	04	03		lead	
17	04	04		zinc	
17	04	05		iron and steel	
17	04	06		tin	
17	04	07		mixed metals	
17	04	09	*	metal waste contaminated with dangerous substances	
17	04	10	*	cables containing oil, coal tar and other dangerous substances	
17	04	11		cables other than those mentioned in 17 04 10	
17	**05**			**soil (including excavated soil from contaminated sites), stones and dredging spoil**	
17	05	03	*	soil and stones containing dangerous substances	
17	05	04		soil and stones other than those mentioned in 17 05 03	
17	05	05	*	dredging spoil containing dangerous substances	
17	05	06		dredging spoil other than those mentioned in 17 05 05	
17	05	07	*	track ballast containing dangerous substances	
17	05	08		track ballast other than those mentioned in 17 05 07	
17	**06**			**insulation materials and asbestos-containing construction materials**	
17	06	01	*	insulation materials containing asbestos	
17	06	03	*	other insulation materials consisting of or containing dangerous substances	
17	06	04		insulation materials other than those mentioned in 17 06 01 and 17 06 03	
17	06	05	*	construction materials containing asbestos (7)	
17	**08**			**gypsum-based construction material**	
17	08	01	*	gypsum-based construction materials contaminated with dangerous substances	
17	08	02		gypsum-based construction materials other than those mentioned in 17 08 01	
17	**09**			**construction and demolition wastes**	
17	09	01	*	construction and demolition wastes containing mercury	
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)	
17	09	03	*	other construction and demolition wastes (including mixed wastes) containing dangerous substances	
17	09	04		mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	
99				**End of service life articles**	
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	
20	01	02		glass	
20	01	08		biodegradable kitchen and canteen waste	
20	01	10		clothes	
20	01	11		textiles	

20	01	13	*	solvents	
20	01	14	*	acids	
20	01	15	*	alkalines	
20	01	17	*	photochemicals	
20	01	18	*	Printer cartridges	n
20	01	19	*	pesticides	
20	01	21	*	fluorescent tubes and other mercury-containing waste	
20	01	23	*	discarded equipment containing chlorofluorocarbons	
20	01	25		edible oil and fat	
20	01	26	*	oil and fat other than those mentioned in 20 01 25	
20	01	27	*	paint, inks, adhesives and resins containing dangerous substances	
20	01	28		paint, inks, adhesives and resins other than those mentioned in 20 01 27	
20	01	29	*	detergents containing dangerous substances	
20	01	30		detergents other than those mentioned in 20 01 29	
20	01	31	*	cytotoxic and cytostatic medicines	d
20	01	32		medicines	a
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	d
20	01	34		batteries and accumulators other than those mentioned in 20 01 33	d
20	01	35	*	discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components (6)	d
20	01	36		discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35	d
20	01	37	*	wood containing dangerous substances	
20	01	38		wood other than that mentioned in 20 01 37	
20	01	39		plastics	
20	01	40		metals	
20	01	41		wastes from chimney sweeping	
20	01	42	*	plastics other than those in 20 01 39	n
20	01	43	*	metals other than those in 20 01 40	n
20	01	44	*	wastes from chimney sweeping other than those in 20 01 41	n
20	01	45	*	Toner cartridges	n
20	01	46		Toner cartridges other than those in 20 01 45	n
20	01	47		Waste from collection of more than one fraction for subsequent separation	n
20	01	48	*	antibiotics	n
20	01	49	*	medicines with narcotic and psychotropic effect	n
20	01	50	*	medicines containing other dangerous active ingredients	n
20	01	51	*	unsorted batches of medicines	n
20	01	99		other fractions not otherwise specified	
20	**02**			**garden and park wastes (including cemetery waste)**	
20	02	01		biodegradable waste	
20	02	02		soil and stones	
20	02	03		other non-biodegradable wastes	
20	**03**			**other municipal wastes**	
20	03	01		mixed municipal waste	
20	03	02		waste from markets	
20	03	03		street-cleaning residues	
20	03	04		septic tank sludge	
20	03	06		waste from sewage cleaning	
20	03	07		bulky waste	
20	03	08		waste from cleaning of beaches, shores and canals	n
20	03	09		waste from cleaning of waste containers	n

20	03	10		Sorting resuidus from mixed municipal wastes	n
20	03	11	*	street-cleaning residues other than 20 03 03	n
20	03	12		waste from gully cleaning	n
20	03	13		Nappies from childcare facilities	n
20	03	14		Feminine hygiene bins	n
20	03	15		Dog collection bins	n
20	03	16		construction and demolition waste from urban areas	n
20	03	17		dead domestic animals	n
20	03	18		other sanitary waste	
20	03	19		Solid recovered fuel according to CEN TC343	
20	03	99		municipal wastes not otherwise specified	
16	**01**			**end-of-life vehicles from different means of transport (including off-road machinery) and wastes from dis-mantling of end-of-life vehicles and vehicle maintenance (except 13, 14, 16 06 and 16 08)**	
16	01	03		end-of-life tyres	
16	01	04	*	end-of-life vehicles	
16	01	06		end-of-life vehicles, containing neither liquids nor other hazardous components	
16	01	07	*	oil filters	
16	01	08	*	components containing mercury	
16	01	09	*	components containing PCBs	
16	01	10	*	explosive components (for example air bags)	
16	01	11	*	brake pads containing asbestos	
16	01	12		brake pads other than those mentioned in 16 01 11	
16	01	13	*	brake fluids	
16	01	14	*	antifreeze fluids containing dangerous substances	
16	01	15		antifreeze fluids other than those mentioned in 16 01 14	
16	01	16		tanks for liquefied gas	
16	01	17		ferrous metal	
16	01	18		non-ferrous metal	
16	01	19		plastic	
16	01	20		glass	
16	01	21	*	hazardous components other than those mentioned in 16 01 07 to 16 01 11 and16 01 13 and 16 01 14	
16	01	22		components not otherwise specified	
16	01	23	*	oil containing shock adsorber	
16	01	99		wastes not otherwise specified	
16	**02**			**wastes from electrical and electronic equipment**	
16	02	01		large (household) appliances other than cooling and freezing appliances	n
16	02	02	*	mix of cooling & freezing appliances incl. CFC/HCFC/HFC-appliances	n
16	02	03	*	CFC/HCFC/HFC cooling & freezing appliances	n
16	02	04	*	CFC/HCFC cooling & freezing appliances	n
16	02	05	*	HFC cooling & freezing appliances	n
16	02	06	*	cabinets' containing CFC/HCFC-foam insulation (all)	n
16	02	07	*	CFC/HCFC-appliances delivered without compressors	n
16	02	08	*	CFC/HCFC air conditioner appliances	n
16	02	09		NH3 cooling & freezing appliances	n
16	02	10	*	other cooling & freezing appliances	n
16	02	11	*	air conditioner appliances	n
16	02	12		IT and telecommunications equipment (ex monitors and ex telephones)	n
16	02	13		telephones and mobile telephones	n
16	02	14		CRT monitors - IT and telecommunications equipment	n
16	02	15		flat screen monitors - IT and telecommunications equipment	n
16	02	16		consumer equipment (ex TV-sets)	n

16	02	17		TV-sets - consumer equipment	n
16	02	18		CRT TV-sets - consumer equipment	n
16	02	19		flat screen TV-sets - consumer equipment	n
16	02	21	*	straight fluorescent tubes	n
16	02	22	*	other fluorescent lamps	n
16	02	23		other lamps (haz. sub.)	n
16	02	24	*	other lamps (no haz. sub.)	n
16	02	25		electrical and electronic tools	n
16	02	26		toys, leisure and sports equipment	n
16	02	27		medical devices	n
16	02	28		monitoring and control instruments	n
16	02	29		automatic dispensers - no cooling function	n
16	02	30		automatic dispensers - cooling function	n
16	02	31		(other) small appliances	n
16	02	32		other WEEE	n
16	02	33		non-WEEE parts sorted	n
16	02	34		plastic packaging	n
16	02	35		cardboard packaging	n
16	02	36		styrofoam packaging	n
16	02	40	*	appliances and components containing PCBs	n
16	02	42	*	appliances and components containing asbestos	n
16	02	44	*	asbestos 'fibres' separated (all)	n
16	02	45	*	mercury containing components	n
16	02	46	*	mercury separated (manually)	n
16	02	47	*	printed circuit boards with Br-FR and/or components to be removed (mix)	n
16	02	48		toner cartridges	n
16	02	49		ink lints	n
16	02	50		CRT 'tubes' with 'E-scrap'	n
16	02	53		cone glass	n
16	02	54	*	front glass uncleaned	n
16	02	55	*	mixed CRT glass residues	n
16	02	65		electrolyte capacitors and other capacitors (no PCB)	n
16	02	66	*	selenium drums	n
16	02	67	*	electronic guns with getter plates/pills	n
16	02	68		getter plates/pills	n
16	02	69	*	other components with hazardous substances	n
16	02	70	*	wood-rich fraction with hazardous substances	n
16	02	71		wood without hazardous substances	n
16	02	72		cables	n
16	02	73		plugs	n
16	02	74		iron-rich' fraction	n
16	02	75		aluminium-rich' fraction	n
16	02	76		copper-rich' fraction	n
16	02	77		other 'metal fractions'	n
16	02	78	*	refractory ceramic fibres (all)	n
16	02	79	*	radioactive substances	n
16	02	80		flat glass	n
16	02	81	*	plastics with Br-FR	n
16	02	82		other plastics 'without Br-FR	n
16	02	83		concrete	n

16	02	84	*	compressor oil - halogen content	n
16	02	85	*	oil non halogenated	n
16	02	86	*	other 'other halogenated solvents and solvent mixtures'	n
16	02	87	*	CFC, HCFC, HFC, HC - mixture	n
16	02	88	*	CFC - R 12 and other CFC	n
16	02	89	*	HCFC - R 22 and other HCFC	n
16	02	90	*	HFC - R 134a and other HFC	n
16	02	91	*	CFC/HCFC/HC - mixture	n
16	02	92	*	R 11/R 12 - mixture	n
16	02	93	*	CFC - R 11	n
16	02	94	*	CFC - R 12	n
16	02	95	*	HCFC - R 141b	n
16	02	96		residual waste - dismantling with hazardous substances	n
16	**04**			**waste explosives**	
16	04	01	*	waste ammunition	
16	04	02	*	fireworks wastes	
16	04	03	*	other waste explosives	
16	**05**			**gases in pressure containers**	
16	05	04	*	gases in pressure containers (including halons) containing dangerous substances	
16	05	05		gases in pressure containers other than those mentioned in 16 05 04	
16	**06**			**batteries and accumulators**	
16	06	01	*	lead batteries	
16	06	02	*	Ni-Cd batteries	
16	06	03	*	mercury-containing batteries	
16	06	04		discharged alkaline and zinc carbon cells (except 16 06 03 and 16 06 05)	a
16	06	05	*	batteries and accumulators other than those mentioned 16 06 01, 16 06 02 and 16 06 03 containing hazardous substances	a
16	06	06	*	separately collected electrolyte from batteries and accumulators	
16	06	07	*	mixed batteries and accumulators	n
16	06	08		Ni-Mh-batteries	n
16	06	09		Lithium batteries	n
16	06	10	*	industrial lead batteries	n
16	**12**			**waste from end of life ships and other means used for the maritime transport**	n
16	12	01	*	end-of-life ships	n
16	12	02		end-of-life ships, containing neither liquids nor other hazardous components	n
16	12	03	*	oil containing metallic components	n
16	12	04	*	components containing mercury	n
16	12	05	*	components containing PCBs	n
16	12	06	*	explosive components	n
16	12	07	*	components containing asbestos	n
16	12	08	*	hazardous components other than those mentioned in 16 12 03 to 16 12 07	n
16	12	09		components not otherwise specified	n
16	12	10	*	waste oil and fuels	n
16	12	11	*	oil water mixtures	n
16	12	12	*	aqueous liquids for further treatment	n
16	12	13	*	other fluids	n
16	12	14		other fluids not mentionend in 16 12 10 to 16 12 13	n
16	12	15		ferrous metal	n
16	12	16		non-ferrous metal	n
16	12	17		plastic	n
16	12	18		glass	n

16	12	19	*	hazardous components other than those mentioned in this section	n
16	12	20		components not otherwise specified	n
16	12	99		wastes not otherwise specified	n
99	99			**other wastes**	
16	05	07	*	discarded inorganic chemicals consisting of or containing dangerous substances	d
16	05	08	*	discarded organic chemicals consisting of or containing dangerous substances	d

Review of the European List of Waste

Final Report

Volume IV

Annex

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1 Questionnaire

Questionnaire on the Implementation of the European list of waste (LoW) as established by Commission Decision 2000/532/EC[1]

Preliminary remarks

The questionnaire covers a wide range of questions with regard to the application of the European Waste List (LoW). We kindly ask you to distribute the questionnaire to other institutions, stakeholders and experts that might be able to contribute to all or to some of the questions.

Please fill in the questionnaire electronically and insert as many lines as needed for your answers.

Wherever it is more convenient for you to provide information in separate documents than to complete the questionnaire please feel free to do so.

If you should refer in your answers to legal or other documents we kindly ask you to send these documents together with the questionnaire or to provide information on where the documents are available (e.g. link for download, institution, etc.).

Your institution might have commented on some aspects of the questionnaire already in previous studies or directly to the Commission. If this should be the case please feel free to attach the previous answers instead of completing the respective questions again, or indicate in which context and to whom the information had been provided.

In case the questionnaire is completed by a sub-national institution the term “country” should generally be understood as the geographic area to which the provided information refers.

We kindly ask you the return the questionnaire by 30. November 2007 to the contact address below. If you should have any questions please don’t hesitate to contact us.

Contact: ARGUS GmbH, Franklinstr. 1, D-10587 Berlin, Germany
Juergen Gonser
Phone: +49 30 398060-0
Fax: +49 30 398060-55
Email: juergen.gonser@argus-statistik.de

[1] Commission Decision 2000/532/EC of 3 May 2000 (OJ L 226, 6.9.2000, p.3), last amended by Council Decision 2001/573/EC of 23 July 2001 (OJ L 203, 28.7.2001, p.18)

Part 1: General information

Information on the institution

(1) Name of the institution:

(2) Department/Unit:

(3) Street / no.:

(4) Postal code / city:

(5) Please describe briefly the tasks of the institution. Focus on those tasks that are related to the application of the European Waste List.

Contact person

(6) Name:

(7) Position within the institution:

(8) Phone:

(9) Email:

Part 2: Transposition and application of the LoW

(10) When did the European Waste List (LoW) become effective in your country for the permitting of treatment, recovery and disposal facilities and for the permitting of waste transports?

(11) Has the LoW been adapted to national requirements in the course of transposition, e.g. by modifications of individual waste codes or by introduction of new waste code?
If yes, please describe the differences compared to the wording of Decision 2000/532/EC.

(12) Has the classification procedure laid down in point 3 of the introduction to the Annex to Decision 2000/532/EC been modified in any way?
If yes, please describe the modifications compared to Decision 2000/532/EC.

(13) Do there exist official guidance documents or tools in your country / region that are intended to support authorities and/or enterprises in the application of the LoW?
If yes, please name the document(s) / tool(s) and send them together with the completed questionnaire. If you cannot provide the document(s) for some reason then please give an overview of the character and the contents of the document(s) (target group, scope of the document, legal status, volume, date of publication, …) and indicate where the document is available.

Part 3: Practical application

Classification problems

(14) Which are according to your experience the most serious classification problems resulting from LoW application?

Please describe the problems and the concerned waste codes or materials. Sort the problems according to their relevance starting with the most serious one.

Specify the extent and the possible impact of the listed classification problems (e.g. frequency of the problem, burden to companies / administration, possible environmental impacts through misclassification, etc.)

Describe how the listed problems are handled in practice.

Need for additional waste codes

(15) Do you think there is a need for the introduction of additional waste codes in the LoW?

(a) If yes, please list the waste types for which new codes should be added.

(b) Please specify the characteristics (consistency, composition, hazard properties) and the origin (economic sector, technical process) of these waste types.

(c) Please indicate to which waste codes the proposed waste types are assigned at present.

(16) Do you think there is a need for the introduction of additional sections or chapters in the LoW?
If yes, please specify the sections/chapters that should be added and give the reasons why they should be added.

(17) The LoW contains 69 waste codes with the ending “99” which are dedicated to non-hazardous waste types that cannot be assigned elsewhere.

(a) Please indicate which of the 99-codes are used in your country and give the respective quantities (annually generated amounts, preferably for year 2004).

(b) Which types of waste are allocated to the 99-codes in your country? Please specify the characteristics (consistency, composition, hazard properties, ...) and the origin (economic sector, technical process) of these waste types for each of the 99-codes used.

(c) Do you consider the 99-codes as helpful or as problematic? Please describe the advantages and problems according to your experience.

(18) The LoW currently contains one waste code with the ending “98*”[2] which is dedicated to hazardous waste that cannot be assigned elsewhere.

(a) Do you think the introduction of 98*-codes in other sections of the LoW would be helpful? If yes, please describe the cases in which 98*-codes would be desirable.

(b) Which problems do you see if additional 98*-codes should be introduced? Please describe.

Unnecessary waste codes

[2] 11 01 98* Other wastes containing dangerous substances

(19) Which of the about 840 waste codes of the LoW are not used in your country? Please list the respective waste codes.

(20) Does the LoW contain waste codes, sections or whole chapters that should be deleted according to your experience? If yes, please list these codes, sections or chapters and specify the reasons why they should be deleted.

Structure of the LoW

(21) The structure of the LoW in its present form is under discussion from different sides. The main criticism refers to:

the lack of a hierarchical structure that would allow a meaningful aggregation of waste types;

the use of the origin of waste as a structuring element;

the non-compatibility with the structure of Annex VIII and IX of the Basel Convention.

Assuming that the structure of the LoW will be revised, which structural changes would you consider as most important? Please feel free to outline your ideas.

(22) Do you consider the LoW a suitable classification for the compilation of waste statistics? What should be changed or improved in this regard according to your opinion? Please describe.

Part 4: Application of hazard criteria and mirror entries

Property H9 “Infectious”

(23) Does there exist a definition of the hazard criteria H9 ‚infectious’ in your country?

(a) If yes, please give the definition:

(b) Are there specific definitions for different waste categories (e.g. health care waste, animal testing waste, …)? If yes, please specify.

(24) Which methods are used to determine whether a waste should be classified as hazardous on account of the criterion H9? Please describe the decision criteria and/or other approaches used, if necessary for the different categories of waste.

(25) What is your experience with the definition and the methods applied? What are the advantages and shortcomings? Please give an assessment, in particular with regard to the relevance of the results and the (analytical) burden on the health care sector and on companies.

(26) For which waste types the property H9 might be relevant according to your experience? Please name the LoW-codes.

Property H12 “Release of toxic or very toxic gases”

(27) Is the criterion H12 applied in your country?

(28) Which methods are used to determine whether a waste should be classified as hazardous on account of the criterion H12?

(a) Please describe the test methods and/or other approaches used.

(b) If analytical methods are applied:

which parameters are analysed?

which concentration levels are applied?

(29) What is your experience with the applied methods? What are the advantages and shortcomings? Please give an assessment, in particular with regard to the relevance of the results and the (analytical) burden on companies.

(30) For which waste types the property H12 might be relevant according to your experience? Please name the LoW-codes.

Property H13 “Substances which, after disposal, yield other substances with characteristics listed above”

(31) Is the criterion H13 applied in your country?

(32) Which methods are used to determine whether a waste should be classified as hazardous on account of the criterion H13?

(a) Please describe the calculation, the test methods and/or other approaches used.

(b) If analytical methods are applied:

which parameters are analysed?

which limit values are set for the release of toxic gases?

(33) What is your experience with the applied methods? What are the advantages and shortcomings? Please give an assessment, in particular with regard to the relevance of the results and the (analytical) burden on companies.

(34) For which waste types the property H13 might be relevant according to your experience? Please name the LoW-codes.

Property H14 “Ecotoxic”

(35) Is the criterion H14 applied in your country?

(36) Which definitions are used to define “ecotoxicity” and on which legal documents are they based?

(37) Which methods are used to determine whether a waste should be classified as hazardous on account of the criterion H14?

(a) Please describe the test methods and/or other approaches used.

(b) If test methods are applied:

which parameters are analysed?

which concentration levels are applied?

(38) What is your experience with the applied methods? What are the advantages and shortcomings? Please give an assessment, in particular with regard to the relevance of the results and the (analytical) burden on companies.

(39) Can you give examples of waste types that are classified as hazardous on account of criterion H14 but would not be considered as hazardous according to any other H-criteria? If yes, please name the LoW-codes.

Properties H3 to H8, H10 and H11

(40) Which problems do you encounter in the application of the hazard criteria H3 to H8, H10 or H11 in practice? Please describe the problems separately for the each of the concerned H-criteria and indicate how these problems are handled.

(41) Which approaches are taken in your country to reduce the analytical efforts for the application of the H-criteria under consideration? Please describe the approaches and give an assessment of their advantages and their shortcomings.

Part 5: Laboratory analyses

(42) How many laboratory analyses are carried out in your country in order to determine whether a waste is hazardous or not? Please give the frequency (per year) and specify the number by waste codes and H-criteria. Please provide estimates if no statistics are available.

(43) If you are not able to provide the respective figures or estimates, where in your country might this information be available?

(44) Which laboratories carry out analyses to determine the hazard properties of waste on behalf of the waste generators, waste management companies or competent authorities? Please name the laboratories or attach a list, if possible.

Part 6: Other remarks

(45) If you should have any other remarks concerning the application and the structure or the LoW please feel free to describe it here.

2 Distribution lists for questionnaire survey

2.1 Distribution List to TAC members

Table 1: TAC members and other national waste experts

Country	Institution
AT	Bundesministerium für Forst- und Landwirtschaft, Umwelt und Wasserschutz
AT	Bundesministerium für Forst- und Landwirtschaft, Umwelt und Wasserschutz
BE	OVAM (Public Waste Agency)
BE	MRW - Ministere de la Region Wallonie
BG	Ministry of Environment and Water Bulgaria
BG	European Environemtn Information and Observation Network - Bulgaria
CY	Ministry of Interior - Cyprus
CZ	Ministry of the Environment - Czech Republic
DE	Auswaertiges Amt
DE	Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit
DE	Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit
DE	Umweltbundesamt
DE	Ministerium für Landwirtschaft und Umweltschutz Sachsen-Anhalt
DE	Regierungspräsidium Darmstadt
DK	Danish Ministry of the Environment
DK	Danish Ministry of the Environment
EE	Ministry of the Environment Estonia
EE	Estonian Environment Information Centre
EEA	European Environment Agency
ES	Representacion Permanente de Espana ante la Union Europea
ES	Ministero de Medio Ambiente
ES	Ministero de Medio Ambiente
FI	Finland's environmental administration
FI	Finland's environmental administration
FR	Ministere de l'economie des finances ed de l'emploi
FR	Agence de l'Environnement et de la Maîtrise de l'Energie
FR	Agence de l'Environnement et de la Maîtrise de l'Energie
FR	Agence de l'Environnement et de la Maîtrise de l'Energie
FR	Agence de l'Environnement et de la Maîtrise de l'Energie
FR	Agence de l'Environnement et de la Maîtrise de l'Energie
FR	Agence de l'Environnement et de la Maîtrise de l'Energie
GR	Hellenic Ministry for the Environment, Physical Planning & Public Works
HU	Ministry of Environment and Water Hungary
HU	Ministry of Environment and Water Hungary
IE	Department of the Environment, Heritage & Local Government
IE	Department of the Environment, Heritage & Local Government
IT	Direzione Generale dell'Energia e delle Risorse Minerarie
IT	Ente per le nuove tecnologie, L'Energia e l#Ambiente
IT	Istituto Superiore di Sanita
LT	Environmental Protection Agency Lithuania
LT	Ministry of the Environment Lithuania
LU	Ministry of the Environment Luxembourg
LV	Ministry of the Environment Latvia
LV	Ministry of the Environment Latvia
LV	Ministry of the Environment Latvia
LV	Latvian Environment, geology and meterology agency
MT	Ministry for Rural Affairs and the Envrionment
MT	Ministry for Rural Affairs and the Envrionment
NL	Netherlands Ministry of Housing, Spatial Planning and the Environment
NL	Netherlands Ministry of Housing, Spatial Planning and the Environment
NL	Netherlands Ministry of Economic Affairs
PL	Ministry of the Environment Poland

Countr y	Institution
PL	Ministry of the Environment Poland
PT	Ministerio do Ambiente, do Ordenamento do Territorio e do Desenvolvimento Regional
PT	Ministerio do Ambiente, do Ordenamento do Territorio e do Desenvolvimento Regional
RO	National Environment Protection Agency Romania
RO	Ministry of the Environment Romania
SE	Swedish Environmental Protection Agency
SE	Ministry of the Environment
SI	Government of the Republic of Slovenia
SK	Ministry of Environment SK
SK	Ministry of Environment SK
UK	Department for Environment, Food and Rural Affairs
UK	Department for Environment, Food and Rural Affairs
UK	Environmental Agency UK

2.2 Distribution List to Permanent Representants of Member States

Table 2: Permanent Representations of Member States

Country
AT
BE
BE
BE
BG
CY
CZ
CZ
DE
DE
DK
EE
EL
ES
FI
FR
HU
HU
IE
IT
LV
LT
LU
LU
MT
NL
PL
PT
RO
SE
SK
SI
UK

2.3 Distribution List to Stakeholders

Table 3: Stakeholders

Abbreviation	Stakeholder
ACEA	European Automobile Manufacturers' Association
APME	Association of Plastics Manufacturers in Europe
BIR	Bureau of International Recycling

Abbreviation	Stakeholder
Business Europe	Business Europe
CEFIC	European Chemical Industry Council
CEMBUREAU	The European Cement Association
CEMR	Council of European Municipalities and Regions
CEPI	Confederation of European Paper Industries
CEWEP	Confederation of European Waste-To-Energy plants
CEWEP	Confederation of European Waste-To-Energy plants
ECOS	European Environmental Citizens Organisation for Standardisation
EEB	European Environmental Bureau
ERFO	European Recovered Fuel Organisation
ETRMA	European Tyre & Rubber Manufacturers' Association
EUCOPRO	European association of co-processing
EULA	European Lime Association
Eurelectric	Association of electric industry in Europe
EURITS	European Union for Responsible Incineration & Treatment
EURO COOP	European Community of Consumer Cooperatives
Eurocommerce	Europcommerce
EUROFER	European Confederation of Iron and Steel
EUROMETAUX	European Association of Metals
Euromines	European Association of Mining Industries
EUROPEN	European Organization for Packaging and the Environment
EXCA	European Expanded Clay Association
FEAD	European Federation of Waste Management and Environmental Services
FEVE	European Container Glass Federation
FoEE	Friends of Earth Europe
FoEE	Friends of Earth Europe
GEIR	Groupement Européen de l'Industrie de la Régénération
Greenpeace	Greenpeace
DHI	DHI Wasser & Umwelt
ISWA	International solid waste association
JAMA	Japan Automobile Manufacturers Association
	Nutzenberger, Klaus
OEA	Organisation of European Aluminium Refiners and Remelters
Orgalime	The European Engineering Industries Association representing the interests of the Mechanical, Electrical, Electronic, Metalworking & Metal Articles Industries
PRO EUROPE	Pro Europe
RREUSE	
UEAPME	European Association of Craft, Small and Medium-sized Enterprises
FFACT	Wielenga, Kees, FFACT Management Consultants

3 Returns to the Questionnaire Survey

3.1 Returns from Member States to the questionnaire survey

Table 4: Returns from Member States to the Questionnaire Survey

Countries	Date of reception	Provided Documents		
		Questionnaire	Comment	Guidance document
Sweden	29.11.2007	X		X
Estonia	30.11.2007	X	X	
UK	03.12.2007	X		X
Slovenia	03.12.2007	X		
Finland	04.12.2007	X		X
Lithuania	07.12.2007	X		
Italy	07.12.2007	X		
Latvia	05.12.2007	X		
Bulgaria	07.12.2007	X		
Hungary	10.12.2007	X		
Germany	19.12.2007	X		X
Poland	24.12.2007	X		
Romania	11.01.2008	X		
Netherlands	15.01.2008	X		
MLU Sachsen-Anhalt(Germany)	28.12.2007	X		X
Austria	05.02.2008	X		
Spain	08.02.2008	X		

3.2 Returns from associations to the questionnaire survey

Table 5: Returns from Associations to the Questionnaire Survey

Organisations	Date of reception	Provided Documents		
		Questionnaire	Comment	Guidance document
ECPA	26.11.2007	X		
ACEA	28.11.2007		X	
Eurelectric	28.11.2007		X	
ETRMA	30.11.2007		X	
CEMBUREAU	30.11.2007		X	
Assocarta	30.11.2007	X		
FNADE	30.11.2007	X		X
ESTAL	01.12.2007	X		
Waste Denmark	05.12.2007	X		
SYPRED	29.11.2007	X		X
Industrieverband Agrar (ECPA)	05.12.2007	X		
Eucopro	19.12.2007	X		
BDE (Bundesverband der deutschen Entsorgungswirtschaft)	19.12.2007		X	
DAKOFA (Danish Waste Management Association)	19.12.2007	X		
BIR	21.12.2007		X	
WEEE Forum	13.01.2008	X		X
FEAD	18.01.2008	X		
Vereniging Afvalbedrijven(Dutch Waste Management Association)	18.01.2008		X	

3.3 Returns from Enterprises to the questionnaire survey

Table 6: Returns from Enterprises to the Questionnaire Survey

Enterprises	Date of reception	Provided Documents		
		Questionnaire	Comment	Guidance document
Treibacher	27.11.2007	X		
Arcelormittal: Industeel Creusot	29.11.2007	X		
Arcelormittal: Industeel Loire	29.11.2007	X		
Arcelormittal: Stahlwerk Eisenhüttenstadt	30.11.2007	X		
SITA	30.11.2007			X
VW	04.12.2007		X	
Arcelormittal - Corporation	14.12.2007	X		
Sigfito (ECPA)	30.11.2007	X		

4 Analysis of statistical information

4.1 Distribution list for request of statistical information

Table 7: Distribution list for the data request on the provision of statistical data on the level of the six-digit LoW codes

Country Code	Institution
BE	Statistics Belgium
BE	OVAM (Public Waste Agency)
BG	NSI - Bulgaria, Environmental statistics
CY	Statistical Service Cyprus
CZ	Czech Statistical Office - Environmental Statistics Section
CZ	Czech Statistical Office - Environmental Statistics Section
DE	Statistisches Bundesamt
DK	Danish Ministry of the Environment
EE	Statistics Estonia
EE	Estonian Environmental Information centre
EL	National Statistical Service of Greece
EL	National Statistical Service of Greece
ES	National Statistics Institute
FI	Statistics Finland - Environment and Energy
FI	Statistics Finland - Environment and Energy
FR	Ministère de l'écologie et du développement durable IFEN
HU	Hungarian Central Statistical Office
HU	Ministry of Environment and Water
IE	Environmental Protection Agency Ireland
IT	Agency for the Protection of the Environment and Technical Services
LU	Administration de l'Environnement
LU	Administration de l'Environnement
LV	Latvian Environment, geology and meterology agency
MT	National Statistics office – Malta; Environment Unit
MT	National Statistics office – Malta; Environment Unit
NL	Statistics Netherlands, taskgroup Environment
NL	Statistics Netherlands, taskgroup Environment
PL	Ministry of Environment, Department of Waste Management
PL	Central Statistical Office, Agriculture and Environment Statistics Division
PT	National Statistical Office / Agricultural and Environment Statistics Unit
PT	Instituto des Residuos
RO	NEPA (National Environment Protection Agency)
RO	National Institute of Statistics Romania
SE	Swedish Environmental Protection Agency
SE	Swedish Environmental Protection Agency
SI	Statistical Office of the Republic of Slovenia
SK	Statistical Office of the Slovak Republic
UK	Department for Environment, Food and Rural Affairs (DEFRA)

4.2 Returns to the request of statistical information

Country	Reply-Date	Data send	Data used
BE	No	n.a.	n.a.
BG	No	n.a.	n.a.
CY	20.11.2007	no data	n.a.
CZ	28.11.2007	send data	Yes
DE	20.12.2007	send data	No
DK	No	n.a.	n.a.
EE	14.02.2008	send data	Yes
EL	27.12.2007	send data	Yes
ES	15.11.2007	no data	n.a.
FI	04.12.2007	send data	Yes
FR	03.01.2008	send data	Yes
HU	12.12.2007	send data	Yes
IE	16.11.2007	send data	Yes
IT	No	n.a.	n.a.
LU	18.12.2007	send data	No
LV	28.11.2007	send data	Yes
MT	12.12.2007	send data	No
NL	21.11.2007	send data	Yes
PL	07.12.2007	send data	Yes
PT	20.12.2007	send data	Yes
RO	No	n.a.	n.a.
SE	21.12.2007	no data	n.a.
SI	07.12.2007	send data	Yes
SK	No	n.a.	n.a.
UK	04.12.2007	send data	No

n.a.: not applicable

4.3 Statistical data for waste items according to WStatR, Annex I

The table below displays the statistical data for the EU 27 for all 48 waste items. The column ‚Statistical data EU 27' shows the counts of values reported by the EU 27 countries for the whole economy for each waste item as follows:

- 0 number of countries which reported a zero value
- >0 number of countries which reported a positive value
- M number of countries, which did not report any value

In addition, the aggregates for the EU 27 are shown in relation to the population. The aggregates reflect the current state of the data as published by Eurostat. Besides the statistical information, the table shows the number of LoW waste codes associated with the waste items according to EWC-Stat as well as the specification of the waste item.

Item No	EWC-Stat	Description	Hazardous	Number of EWL codes aggregated	Statistical data EU 27			
					0	>0	M	Amount [kg/cap,a]
1	01.1	Spent solvents	h	20	2	25	0	6,0
2	01.2	Acid, alkaline or saline wastes	nh	13	5	22	0	6,8
3	01.2	Acid, alkaline or saline wastes	h	43	2	25	0	9,1
4	01.3	Used oils	h	33	2	25	0	8,3
5	01.4	Spent chemical catalysts	nh	3	10	17	0	0,1
6	01.4	Spent chemical catalysts	h	4	5	22	0	0,2
7	02	Chemical preparation wastes	nh	47	3	24	0	7,5
8	02	Chemical preparation wastes	h	61	1	26	0	7,0
9	03.1	Chemical deposits and residues	nh	28	2	25	0	24,3
10	03.1	Chemical deposits and residues	h	75	2	25	0	22,2
11	03.2	Industrial effluent sludges	nh	47	3	24	0	14,2
12	03.2	Industrial effluent sludges	h	39	2	25	0	3,4
13	05	Health care and biological wastes	nh	5	5	22	0	1,7
14	05	Health care and biological wastes	h	2	1	26	0	1,7
15	06	Metallic wastes	nh	26	1	26	0	151,9
16	06	Metallic wastes	h	4	5	22	0	0,5
17	07.1	Glass wastes	nh	6	0	27	0	29,9
18	07.1	Glass wastes	h	1	12	15	0	0,1
19	07.2	Paper and cardboard wastes	nh	5	0	27	0	106,0
20	07.3	Rubber wastes	nh	1	1	26	0	5,3
21	07.4	Plastic wastes	nh	8	1	26	0	22,3
22	07.5	Wood wastes	nh	7	1	26	0	173,0
23	07.5	Wood wastes	h	3	5	22	0	6,8
24	07.6	Textile wastes	nh	12	2	25	0	8,4
25	07.7	Waste containing PCB	h	6	2	25	0	0,1
26	08 (excl. 08.1, 08.41)	Discarded equipment (excluding discarded vehicles and batteries and accumulators waste)	nh	9	2	25	0	4,2
27	08 (excl. 08.1, 08.41)	Discarded equipment (excluding discarded vehicles and batteries and accumulators waste)	h	11	3	24	0	1,9
28	08.1	Discarded vehicles	nh	1	5	22	0	9,3
29	08.1	Discarded vehicles	h	1	4	23	0	6,9
30	08.41	Batteries and accumulators wastes	nh	3	7	20	0	0,3
31	08.41	Batteries and accumulators wastes	h	4	1	26	0	1,8
32	09 (excl. 09.11, 09.3)	Animal and vegetal wastes (excluding animal of food preparation and products; and excluding animal faeces, urine and manure)	nh	24	2	25	0	144,4
33	09.11	Animal waste of food preparation and products	nh	3	1	26	0	17,5
34	09.3	Animal faeces, urine and manure	nh	1	4	23	0	51,0
35	10.1	Household and similar wastes	nh	4	0	27	0	416,9
36	10.2	Mixed and undifferentiated materials	nh	22	1	26	0	124,4
37	10.2	Mixed and undifferentiated materials	h	2	2	25	0	7,7
38	10.3	Sorting residues	nh	11	2	25	0	67,6
39	10.3	Sorting residues	h	3	10	17	0	1,2
40	11 (excl. 11.3)	Common sludges (excluding dredging spoils)	nh	17	1	26	0	31,3
41	11.3	Dredging spoils	nh	1	6	21	0	195,8
42	12 (excl. 12.4, 12.6)	Mineral wastes (excluding combustion wastes, contaminated soils and polluted dredging spoils)	nh	72	1	26	0	3655,5
43	12 (excl. 12.4, 12.6)	Mineral wastes (excluding combustion wastes, contaminated soils and polluted dredging spoils)	h	36	1	26	0	21,3
44	12.4	Combustion wastes	nh	55	1	26	0	305,3
45	12.4	Combustion wastes	h	51	2	25	0	25,5
46	12.6	Contaminated soils and polluted dredging spoils	h	4	5	22	0	21,3
47	13	Solidified, stabilised or vitrified wastes	nh	3	12	15	0	4,8
48	13	Solidified, stabilised or vitrified wastes	h	2	12	14	1	1,2

4.4 EWC-Stat and corresponding LoW-codes

Table 8: Waste items according to Annex I of the WStatR with EWC-Stat codes and corresponding LoW codes

Item No	EWC-Stat	Description	Hazardous	No. of LoW codes	LoW Codes[1)]
1	01.1	Spent solvents	h	20	070103*, 070104*, 070203*, 070204*, 070303*, 070304*, 070403*, 070404*, 070503*, 070504*, 070603*, 070604*, 070703*, 070704*, 140601*, 140602*, 140603*, 140604*, 140605*, 200113*
2	01.2	Acid, alkaline or saline wastes	nh	13	030309, 050116, 050702, **060199**, **060299**, 060314, 060316, **060399**, **060499**, 060603, **060699**, 110114, 110206
3	01.2	Acid, alkaline or saline wastes	h	43	050111*, 060101*, 060102*, 060103*, 060104*, 060105*, 060106*, 060201*, 060203*, 060204*, 060205*, 060311*, 060313*, 060315*, 060403*, 060404*, 060405*, 060602*, 060704*, 080316*, 090101*, 090102*, 090103*, 090104*, 090105*, 100109*, 100308*, 100403*, 110105*, 110106*, 110107*, 110108*, 110113*, 110205*, 110301*, 110302*, 110504*, 160606*, 160901*, 160902*, 191104*, 200114*, 200115*
4	01.3	Used oils	h	33	050102*, 050103*, 050104*, 050112*, 080319*, 080417*, 120106*, 120107*, 120108*, 120109*, 120110*, 120112*, 120118*, 120119*, 130104*, 130105*, 130109*, 130110*, 130111*, 130112*, 130113*, 130204*, 130205*, 130206*, 130207*, 130208*, 130306*, 130307*, 130308*, 130309*, 130310*, 130506*, 200126*
5	01.4	Spent chemical catalysts	nh	3	160801, 160803, 160804
6	01.4	Spent chemical catalysts	h	4	160802*, 160805*, 160806*, 160807*
7	02	Chemical preparation wastes	nh	47	020109, 020703, **030199**, **030299**, 040109, 040215, 040217, **060799**, **060899**, **061099**, **061199**, 070215, 070217, 070514, 080112, 080114, 080116, 080118, 080120, **080199**, 080201, **080299**, 080307, 080308, 080313, 080315, 080318, **080399**, 080410, 080412, 080414, 080416, **080499**, 100916, 101014, 101016, **110599**, 160115, 160505, 160509, 180107, 180109, 180206, 180208, 200128, 200130, 200132
8	02	Chemical preparation wastes	h	61	020108*, 030201*, 030202*, 030203*, 030204*, 030205*, 040214*, 040216*, 050701*, 060802*, 061002*, 061301*, 070214*, 070216*, 070413*, 070513*, 080111*, 080113*, 080115*, 080117*, 080119*, 080121*, 080312*, 080314*, 080317*, 080409*, 080411*, 080413*, 080415*, 080501*, 100913*, 100915*, 101013*, 101015*, 110116*, 110198*, 150110*, 160113*, 160114*, 160401*, 160402*, 160403*, 160504*, 160506*, 160507*, 160508*, 160903*, 160904*, 180106*, 180108*, 180205*, 180207*, 190204*, 190208*, 190209*, 190211*, 200117*, 200119*, 200127*, 200129*, 200131*
9	03.1	Chemical deposits and residues	nh	28	030302, 040104, 040105, 050117, **050699**, **060999**, 061303, **061399**, **070199**, **070299**, **070399**, **070499**, **070599**, **070699**, **070799**, 100125, 100302, 100318, 100813, 100814, 110112, 110203, 150203, 190903, 190904, 190905, 190906, 200141

Item No	EWC-Stat	Description	Hazardous	No. of LoW codes	LoW Codes1)
10	03.1	Chemical deposits and residues	h	75	040103*, 050106*, 050107*, 050108*, 050115*, 050601*, 050603*, 060702*, 060703*, 061302*, 061305*, 070101*, 070107*, 070108*, 070109*, 070110*, 070201*, 070207*, 070208*, 070209*, 070210*, 070301*, 070307*, 070308*,070309*, 070310*, 070401*, 070407*, 070408*, 070409*, 070410*, 070501*, 070507*, 070508*, 070509*, 070510*, 070601*, 070607*, 070608*, 070609*, 070610*, 070701*, 070707*, 070708*, 070709*, 070710*, 090113*, 100317*, 100812*, 110111*, 110115*, 130401*, 130402*, 130403*, 130501*, 130502*, 130503*, 130507*, 130508*, 130701*, 130702*, 130703*, 130801*, 130802*, **130899***, 150202*, 160709*, 190110*, 190207*, 190403*, 190806*, 190807*, 190808*, 191101*, 191102*
11	03.2	Industrial effluent sludges	nh	47	030305, 040106, 040107, 040220, 050110, 050114, **050199**, 050604, **050799**, 060503, 070112, 070212, 070312, 070412, 070512, 070612, 070712, 100121, 100123, 100126, 100212, 100215, 100328, 100410, 100509, 100610, 100708, 100820, 101120, 101213, 110110, **110299**, 120115, 161002, 161004, 190206, 190404, **190699**, 190703, 190812, 190814, **190899**, 191106, **191199**, 191304, 191306, 191308
12	03.2	Industrial effluent sludges	h	39	010505*, 040219*, 050109*, 060502*, 070111*, 070211*, 070311*, 070411*, 070511*, 070611*, 070711*, 100120*, 100122*, 100211*, 100327*, 100409*, 100508*, 100609*, 100707*, 100819*, 101119*, 110109*, 110207*, 120114*, 120301*, 120302*, 160708*, 161001*, 161003*, 190205*, 190702*, 190810*, 190811*, 190813*, 191103*, 191105*, 191303*, 191305*, 191307*
13	05	Health care and biological wastes	nh	5	180101, 180102, 180104, 180201, 180203
14	05	Health care and biological wastes	h	2	180103*, 180202
15	06	Metallic wastes	nh	26	020110, 100210, **101099**, 101206, 110501, 120101, 120102, 120103, 120104, 150104, 160117, 160118, 170401, 170402, 170403, 170404, 170405, 170406, 170407, 170411, 190102, 191001, 191002, 191202, 191203, 200140
16	06	Metallic wastes	h	4	090106*, 170409*, 170410*, 180110*
17	07.1	Glass wastes	nh	6	101112, 150107, 160120, 170202, 191205, 200102
18	07.1	Glass wastes	h	1	101111*
19	07.2	Paper and cardboard wastes	nh	5	030310, **030399**, 150101, 191201, 200101
20	07.3	Rubber wastes	nh	1	160103
21	07.4	Plastic wastes	nh	8	020104, 070213, 120105, 150102, 160119, 170203, 191204, 200139
22	07.5	Wood wastes	nh	7	030101, 030105, 030301, 150103, 170201, 191207, 200138
23	07.5	Wood wastes	h	3	030104*, 191206*, 200137*
24	07.6	Textile wastes	nh	12	040101, 040102, 040108, **040199**, 040209, 040210, 040221, 040222, 150109, 191208, 200110, 200111
25	07.7	Waste containing PCB	h	6	130101*, 130301*, 160109*, 160209*, 160210*, 170902*
26	08 (excl. 08.1, 08.41)	Discarded equipment (excluding discarded vehicles and batteries and accumulators waste)	nh	9	090110, 090112, 160112, 160116, 160122, **160199**, 160214, 160216, 200136
27	08 (excl. 08.1, 08.41)	Discarded equipment (excluding discarded vehicles and batteries and accumulators waste)	h	11	090111*, 160107*, 160108*, 160110*, 160121*, 160211*, 160213*, 160215*, 200121*, 200123*, 200135*
28	08.1	Discarded vehicles	nh	1	160106
29	08.1	Discarded vehicles	h	1	160104*
30	08.41	Batteries and accumulators wastes	nh	3	160604, 160605, 200134
31	08.41	Batteries and accumulators wastes	h	4	160601*, 160602*, 160603*, 200133*
32	09 (excl. 09.11, 09.3)	Animal and vegetal wastes (excluding animal of food preparation and products; and excluding animal faeces, urine and manure)	nh	24	020101, 020103, 020107, **020199**, 020203, **020299**, 020301, 020302, 020303, 020304, **020399**, **020499**, 020501, **020599**, 020601, 020602, 020701, 020702, 020704, 190809, 200108, 200125, 200201, 200302

Item No	EWC-Stat	Description	Hazardous	No. of LoW codes	LoW Codes1)
33	09.11	Animal waste of food preparation and products	nh	3	020102, 020201, 020202
34	09.3	Animal faeces, urine and manure	nh	1	020106
35	10.1	Household and similar wastes	nh	4	200301, 200303, 200307, **200399**
36	10.2	Mixed and undifferentiated materials	nh	22	**020699**, **020799**, **040299**, 090107, 090108, **090199**, **100199**, **100699**, **100799**, **100899**, **110199**, 120113, **120199**, 150105, 150106, 160304, 160306, **160799**, 190203, 190210, **190299**, **200199**
37	10.2	Mixed and undifferentiated materials	h	2	160303*, 160305*
38	10.3	Sorting residues	nh	11	030307, 030308, 190501, 190502, 190503, **190599**, 190801, 191004, 191006, 191210, 191212
39	10.3	Sorting residues	h	3	191003*, 191005*, 191211*
40	11 (excl. 11.3)	Common sludges (excluding dredging spoils)	nh	17	020204, 020305, 020403, 020502, 020603, 020705, 030311, 050113, 190603, 190604, 190605, 190606, 190805, 190902, **190999**, 200304, 200306
41	11.3	Dredging spoils	nh	1	170506
42	12 (excl. 12.4, 12.6)	Mineral wastes (excluding combustion wastes, contaminated soils and polluted dredging spoils)	nh	72	010101, 010102, 010306, 010308, 010309, **010399**, 010408, 010409, 010410, 010411, 010412, 010413, **010499**, 010504, 010507, 010508, **010599**, 020401, 020402, 060904, 061101, 080202, 080203, **100299**, 100305, **100399**, **100499**, **100599**, 100906, 100908, 100914, **100999**, 101006, 101008, 101103, 101105, 101110, 101114, **101199**, 101201, 101208, 101212, **101299**, 101301, 101304, 101306, 101310, 101311, 101314, **101399**, 120117, 120121, 161102, 161104, 161106, 170101, 170102, 170103, 170107, 170302, 170504, 170508, 170604, 170802, 170904, **190199**, 190802, 190901, 191209, 191302, 200202, 200203
43	12 (excl. 12.4, 12.6)	Mineral wastes (excluding combustion wastes, contaminated soils and polluted dredging spoils)	h	36	010304*, 010305*, 010307*, 010407*, 010506*, 060701*, 060903*, 061304*, 100905*, 100907*, 101005*, 101007*, 101109*, 101113*, 101211*, 101309*, 110202*, 120116*, 120120*, 150111*, 160111*, 160212*, 161101*, 161103*, 161105*, 170106*, 170204*, 170301*, 170303*, 170601*, 170603*, 170605*, 170801*, 170901*, 170903*, 191301*
44	12.4	Combustion wastes	nh	55	060902, 100101, 100102, 100103, 100105, 100107, 100115, 100117, 100119, 100124, 100201, 100202, 100208, 100214, 100316, 100320, 100322, 100324, 100326, 100330, 100501, 100504, 100511, 100601, 100602, 100604, 100701, 100702, 100703, 100704, 100705, 100804, 100809, 100811, 100816, 100818, 100903, 100910, 100912, 101003, 101010, 101012, 101116, 101118, 101203, 101205, 101210, 101307, 101313, 110502, 190112, 190114, 190116, 190118, 190119
45	12.4	Combustion wastes	h	51	100104*, 100113*, 100114*, 100116*, 100118*, 100207*, 100213*, 100304*, 100309*, 100315*, 100319*, 100321*, 100323*, 100325*, 100329*, 100401*, 100402*, 100404*, 100405*, 100406*, 100407*, 100503*, 100505*, 100506*, 100510*, 100603*, 100606*, 100607*, 100808*, 100810*, 100815*, 100817*, 100909*, 100911*, 101009*, 101011*, 101115*, 101117*, 101209*, 101312*, 101401*, 110503*, 190105*, 190106*, 190107*, 190111*, 190113*, 190115*, 190117*, 190402*, 191107*
46	12.6	Contaminated soils and polluted dredging spoils	h	4	050105*, 170503*, 170505*, 170507*
47	13	Solidified, stabilised or vitrified wastes	nh	3	190305, 190307, 190401
48	13	Solidified, stabilised or vitrified wastes	h	2	190304*, 190306*

1) 99-codes are highlighted in bold print because they are discussed in depth in volume 3.

4.5 Overview of collected data

Country	Year	Data coverage	Source	Statistical unit	No. of stat. units available	Number of waste-types			
						Total	used	not used	additional codes[4]
CZ	2004	All sectors	DR	Enterprise	Yes	720	720	0	0
EE	2005	All sectors	DR	Enterprise	No	363	360	3	17
EE	2006	All sectors	DR	Enterprise	No	351	348	3	20
EL	2004	All sectors	DR	Enterprise	No	839	386	453	0
FI[1]	2006	All sectors	DR	Local unit	Yes	563	371	**192**	**2**
FR	2006	only HW with gaps for agriculture and services	DR	Local unit	Yes	375	375	0	0
HU	2004	All sectors (mining waste separately)	DR	Local unit (not available)	Yes (No)	700	700	0	0
IE	2004	Waste from manufacturing sector	DR	Enterprise	Yes	410	408	1	0
LV	2006	All sectors	DR	Enterprise	Yes	317	317	0	0
NL[1]	2004	Non-haz. waste [NACE C-E]/ hazardous waste all sectors	DR	Enteprise/ Local Unit	Yes/No	319/ 218	202/ 218	**117/ 0**	**0/ 0**
PL	2004	All chapters except 20	DR	not available	No	749	744	5	61
PT	2004	All sectors	DR	Enterprise	No	611	577	34	0
SI	2004	All sectors	DR	KAU	Yes	592	592	0	0
BG[2]	2004	99-codes, All sectors	Q	not available	No	32	32	0	0
DE[2]	2005	99-codes & unused codes, All sectors	Q	not available	No	119	50	69	0
HU[2]	2004	99-codes & unused codes, All sectors	Q	not available	No	258	119	139	0
HU[2]	2005	99-codes & unused codes, All sectors	Q	not available	No	257	103	154	0
HU[2]	2006	99-codes & unused codes, All sectors	Q	not available	No	257	93	164	0
IT[2]	2004	99-codes, All sectors	Q	not available	No	87	70	17	0
LT[2]	2005/06	99-codes & unused codes, All sectors	Q	not available	No	407	11	396	0
LV[2]	2004	99-codes, All sectors	Q	not available	No	18	18	0	0
NL[2]	2006	99-codes & unused codes, All sectors	Q	not available	No	179	64	115	0
RO[2]	2004	99-codes, All sectors	Q	not available	No	51	51	0	0
SI[2]	2004	99-codes & unused codes, All sectors	Q	not available	No	302	53	249	0

1) "not used" refers to confidential data
2) "used" refers only to "99"-codes
3) DR = data request; Q = Questionnaire
4) Number of additional codes is included in number of "used" waste-types

4.6 Frequency of usage and descriptive parameters of share from national amount by six-digit code from LoW - non-hazardous wastes

Waste code	No of countries that				Descriptive statistical parameters			
	provided information	Does not use code	Uses Code	Provided quantities	Mean	Median	Min	Max
010101	14	5	9	6	1.0802%	0.0042%	0.0000%	3.3372%
010102	14	2	12	8	14.6638%	1.2582%	0.0350%	44.6763%
010306	14	4	10	6	1.8281%	0.5341%	0.0023%	8.7777%
010308	13	6	7	5	0.0071%	0.0002%	0.0000%	0.0296%
010309	13	7	6	3	2.4835%	2.9807%	0.0000%	4.4698%
010399	15	4	11	9	0.5374%	0.0020%	0.0000%	4.4409%
010408	14	2	12	8	0.4162%	0.0806%	0.0013%	2.8360%
010409	13	1	12	8	0.3370%	0.1062%	0.0028%	1.8840%
010410	13	2	11	7	0.1108%	0.0280%	0.0003%	0.4392%
010411	13	10	3	1	0.0005%	0.0005%	0.0005%	0.0005%
010412	13	3	10	7	3.6159%	0.0493%	0.0000%	23.6094%
010413	13	2	11	8	0.4424%	0.0254%	0.0014%	2.2210%
010499	14	3	11	10	0.2176%	0.0148%	0.0000%	1.8278%
010504	13	6	7	5	0.1332%	0.1028%	0.0000%	0.3336%
010507	13	8	5	3	0.0022%	0.0018%	0.0016%	0.0032%
010508	13	7	6	3	0.0653%	0.0243%	0.0208%	0.1507%
010599	14	5	9	8	0.0803%	0.0069%	0.0001%	0.5790%
020101	14	2	12	9	0.0379%	0.0254%	0.0000%	0.1150%
020102	14	1	13	10	0.1436%	0.0879%	0.0222%	0.5221%
020103	14		14	11	0.3390%	0.1146%	0.0204%	1.2043%
020104	14	2	12	8	0.0054%	0.0032%	0.0003%	0.0134%
020106	14	2	12	9	3.5960%	0.8982%	0.0831%	15.0674%
020107	13	2	11	6	0.0152%	0.0020%	0.0005%	0.0533%
020109	13	1	12	7	0.0148%	0.0000%	0.0000%	0.1032%
020110	14		14	11	0.0028%	0.0007%	0.0000%	0.0185%
020199	14		14	13	0.0172%	0.0141%	0.0002%	0.0528%
020201	14		14	11	0.0559%	0.0287%	0.0000%	0.1999%
020202	14		14	11	0.7716%	0.4397%	0.0079%	2.4454%
020203	14		14	11	0.2757%	0.1641%	0.0009%	1.2705%
020204	14		14	11	0.1732%	0.0687%	0.0007%	0.7540%
020299	16		16	14	0.1553%	0.0526%	0.0003%	1.1056%
020301	14	1	13	11	0.3087%	0.1593%	0.0000%	1.5946%
020302	13	7	6	3	0.0000%	0.0000%	0.0000%	0.0000%
020303	13	5	8	6	0.0057%	0.0027%	0.0001%	0.0184%
020304	14	1	13	10	2.5478%	0.0877%	0.0095%	24.2827%
020305	13	2	11	9	0.2284%	0.0181%	0.0000%	1.6458%
020399	16	1	15	14	0.1545%	0.0592%	0.0000%	1.0369%
020401	13	2	11	8	1.2099%	0.7525%	0.1938%	4.0696%
020402	13	2	11	8	0.6045%	0.3420%	0.0599%	2.6278%
020403	13	4	9	6	0.5436%	0.0012%	0.0002%	3.2310%
020499	15	2	13	12	0.9230%	0.0179%	0.0002%	8.5180%
020501	14		14	11	0.1491%	0.0717%	0.0004%	0.4662%

Waste code	No of countries that				Descriptive statistical parameters			
	provided information	Does not use code	Uses Code	Provided quantities	Mean	Median	Min	Max
020502	14		14	10	0.1070%	0.0251%	0.0034%	0.5173%
020599	15		15	14	0.3403%	0.0254%	0.0000%	3.9926%
020601	14	2	12	9	0.0320%	0.0134%	0.0018%	0.1081%
020602	13	8	5	4	0.0000%	0.0000%	0.0000%	0.0000%
020603	14	5	9	7	0.0112%	0.0052%	0.0001%	0.0499%
020699	15	2	13	12	0.0040%	0.0016%	0.0001%	0.0199%
020701	14		14	11	0.5376%	0.0994%	0.0053%	3.1354%
020702	14	2	12	9	0.1612%	0.0817%	0.0003%	0.5215%
020703	14	5	9	6	0.0104%	0.0003%	0.0000%	0.0601%
020704	14	1	13	10	0.4045%	0.0560%	0.0001%	2.1189%
020705	14	4	10	8	0.0406%	0.0077%	0.0001%	0.1513%
020799	16		16	14	0.1340%	0.0495%	0.0000%	0.6969%
030101	14		14	10	0.9819%	0.2598%	0.0198%	4.3758%
030105	14		14	11	4.7807%	2.5650%	0.1643%	21.4867%
030199	16	1	15	14	0.1135%	0.0156%	0.0002%	0.5117%
030299	14	6	8	6	0.0081%	0.0000%	0.0000%	0.0483%
030301	13		13	10	1.3434%	0.2101%	0.0006%	7.3206%
030302	13	6	7	5	0.1682%	0.0367%	0.0001%	0.5479%
030305	13	2	11	8	0.4376%	0.1821%	0.0000%	1.2920%
030307	14	1	13	10	0.4028%	0.1482%	0.0059%	1.8305%
030308	14		14	11	0.0723%	0.0696%	0.0008%	0.1962%
030309	13	5	8	5	0.1553%	0.1479%	0.0120%	0.3829%
030310	13	3	10	8	0.6353%	0.1431%	0.0000%	3.9264%
030311	14	2	12	10	1.8224%	0.0722%	0.0000%	12.9228%
030399	14	2	12	11	0.1855%	0.0117%	0.0015%	1.3730%
040101	13	2	11	7	0.0157%	0.0106%	0.0006%	0.0443%
040102	13	5	8	3	0.0013%	0.0015%	0.0002%	0.0021%
040104	13	6	7	5	0.0222%	0.0014%	0.0000%	0.0937%
040105	13	7	6	4	0.6319%	0.0139%	0.0041%	2.4958%
040106	13	1	12	8	0.0462%	0.0037%	0.0000%	0.2501%
040107	13	5	8	3	0.0133%	0.0152%	0.0009%	0.0239%
040108	13	3	10	6	0.2320%	0.0044%	0.0028%	1.3514%
040109	13	3	10	7	0.0118%	0.0011%	0.0001%	0.0720%
040199	15	1	14	12	0.0258%	0.0016%	0.0000%	0.2206%
040209	14	2	12	9	0.0341%	0.0082%	0.0003%	0.1532%
040210	13	2	11	6	0.0102%	0.0008%	0.0000%	0.0500%
040215	13	5	8	6	0.0082%	0.0021%	0.0000%	0.0311%
040217	13	3	10	7	0.0045%	0.0000%	0.0000%	0.0309%
040220	14	4	10	8	0.0061%	0.0053%	0.0002%	0.0120%
040221	14	1	13	10	0.1154%	0.0116%	0.0024%	0.8897%
040222	14		14	11	0.0677%	0.0206%	0.0006%	0.4501%
040299	16		16	13	0.1287%	0.0033%	0.0002%	1.6198%
050110	14	5	9	6	0.0005%	0.0005%	0.0000%	0.0010%
050113	13	9	4	1	0.0002%	0.0002%	0.0002%	0.0002%
050114	13	9	4	1	0.0000%	0.0000%	0.0000%	0.0000%
050116	13	5	8	5	0.6714%	0.0022%	0.0003%	3.3440%
050117	13	3	10	7	0.0049%	0.0007%	0.0000%	0.0300%

Waste code	No of countries that				Descriptive statistical parameters			
	provided information	Does not use code	Uses Code	Provided quantities	Mean	Median	Min	Max
050199	15	4	11	11	0.0046%	0.0009%	0.0000%	0.0178%
050604	13	11	2	1	0.0000%	0.0000%	0.0000%	0.0000%
050699	14	7	7	6	0.0495%	0.0002%	0.0000%	0.2948%
050702	13	7	6	3	0.0003%	0.0000%	0.0000%	0.0008%
050799	14	5	9	7	0.0113%	0.0001%	0.0000%	0.0588%
060199	14	2	12	11	0.0061%	0.0014%	0.0000%	0.0281%
060299	16	4	12	12	0.0048%	0.0012%	0.0000%	0.0182%
060314	14		14	11	0.1123%	0.0019%	0.0000%	1.0995%
060316	13	4	9	7	0.0104%	0.0002%	0.0000%	0.0642%
060399	15	2	13	11	0.0109%	0.0003%	0.0000%	0.0898%
060499	15	4	11	9	0.0010%	0.0001%	0.0000%	0.0033%
060503	14	1	13	10	0.1446%	0.0117%	0.0002%	1.0247%
060603	13	6	7	3	0.0313%	0.0000%	0.0000%	0.0939%
060699	14	6	8	6	0.0083%	0.0001%	0.0001%	0.0344%
060799	13	8	5	3	0.0041%	0.0017%	0.0000%	0.0104%
060899	15	4	11	10	0.0151%	0.0003%	0.0000%	0.1406%
060902	13	7	6	2	0.0000%	0.0000%	0.0000%	0.0000%
060904	13	8	5	2	1.4087%	1.4087%	0.0011%	2.8164%
060999	14	8	6	5	7.6421%	0.0010%	0.0000%	38.1950%
061099	15	5	10	7	0.0015%	0.0000%	0.0000%	0.0100%
061101	13	10	3	1	3.3580%	3.3580%	3.3580%	3.3580%
061199	15	6	9	9	0.0948%	0.0078%	0.0001%	0.6196%
061303	13	7	6	3	0.0006%	0.0008%	0.0001%	0.0009%
061399	16	3	13	12	0.0071%	0.0008%	0.0000%	0.0591%
070112	14	6	8	6	0.0162%	0.0048%	0.0007%	0.0720%
070199	16		16	15	0.0388%	0.0024%	0.0000%	0.2651%
070212	14	2	12	9	0.0082%	0.0001%	0.0000%	0.0506%
070213	14		14	11	0.0848%	0.0448%	0.0000%	0.3423%
070215	13	3	10	5	0.0008%	0.0000%	0.0000%	0.0039%
070217	13	7	6	4	0.0003%	0.0002%	0.0001%	0.0009%
070299	16		16	16	0.0290%	0.0071%	0.0003%	0.1405%
070312	13	8	5	3	0.0002%	0.0001%	0.0001%	0.0003%
070399	14	5	9	8	0.0009%	0.0004%	0.0000%	0.0034%
070412	13	10	3	2	0.0002%	0.0002%	0.0000%	0.0004%
070499	14	4	10	7	0.0000%	0.0000%	0.0000%	0.0001%
070512	14	6	8	5	0.0174%	0.0008%	0.0001%	0.0683%
070514	14	5	9	5	0.0146%	0.0054%	0.0001%	0.0516%
070599	16	3	13	11	0.0060%	0.0022%	0.0000%	0.0410%
070612	13	4	9	5	0.0032%	0.0010%	0.0000%	0.0124%
070699	15	2	13	12	0.0030%	0.0017%	0.0000%	0.0093%
070712	14	9	5	3	0.0577%	0.0087%	0.0041%	0.1603%
070799	15	2	13	12	0.0151%	0.0012%	0.0000%	0.1661%
080112	14		14	11	0.0030%	0.0005%	0.0001%	0.0142%
080114	14	3	11	7	0.0010%	0.0008%	0.0000%	0.0026%
080116	14	1	13	9	0.0022%	0.0012%	0.0000%	0.0061%
080118	14	4	10	6	0.0004%	0.0004%	0.0000%	0.0009%
080120	14		14	9	0.0016%	0.0006%	0.0000%	0.0055%

Waste code	No of countries that				Descriptive statistical parameters			
	provided information	Does not use code	Uses Code	Provided quantities	Mean	Median	Min	Max
080199	15	1	14	13	0.0019%	0.0006%	0.0000%	0.0108%
080201	14	1	13	9	0.0021%	0.0003%	0.0000%	0.0106%
080202	13	5	8	5	0.0045%	0.0018%	0.0004%	0.0163%
080203	13	8	5	3	0.0759%	0.0064%	0.0003%	0.2211%
080299	15	3	12	10	0.0024%	0.0009%	0.0000%	0.0122%
080307	14	2	12	7	0.0002%	0.0002%	0.0000%	0.0006%
080308	14	1	13	10	0.0036%	0.0017%	0.0000%	0.0122%
080313	14	3	11	7	0.0004%	0.0002%	0.0000%	0.0014%
080315	13	3	10	6	0.0001%	0.0000%	0.0000%	0.0002%
080318	14	1	13	10	0.0011%	0.0009%	0.0000%	0.0052%
080399	14	4	10	8	0.0015%	0.0003%	0.0000%	0.0105%
080410	14	1	13	10	0.0015%	0.0015%	0.0000%	0.0030%
080412	13	3	10	5	0.0012%	0.0002%	0.0001%	0.0050%
080414	14	2	12	7	0.0007%	0.0003%	0.0000%	0.0021%
080416	13	2	11	7	0.0008%	0.0003%	0.0000%	0.0023%
080499	14	3	11	11	0.0012%	0.0009%	0.0000%	0.0031%
090107	13		13	10	0.0039%	0.0002%	0.0000%	0.0359%
090108	14		14	9	0.0009%	0.0000%	0.0000%	0.0065%
090110	13	9	4	3	0.0000%	0.0000%	0.0000%	0.0000%
090112	13	8	5	2	0.0000%	0.0000%	0.0000%	0.0000%
090199	15	3	12	9	0.0005%	0.0004%	0.0000%	0.0011%
100101	14		14	11	2.3229%	1.3827%	0.0677%	10.7125%
100102	14		14	11	8.7819%	5.4090%	0.0002%	53.7964%
100103	14	2	12	8	0.4277%	0.0126%	0.0012%	3.1716%
100105	14	3	11	8	1.3299%	0.9442%	0.0005%	3.0553%
100107	13	4	9	6	1.0768%	0.2181%	0.0050%	4.6579%
100115	13	3	10	6	0.0635%	0.0035%	0.0000%	0.2908%
100117	13	5	8	4	0.1311%	0.0135%	0.0004%	0.4969%
100119	13	3	10	6	0.0033%	0.0010%	0.0000%	0.0158%
100121	13	3	10	8	0.0374%	0.0068%	0.0002%	0.1625%
100123	14	6	8	5	0.0061%	0.0017%	0.0001%	0.0219%
100124	13	3	10	6	0.0697%	0.0033%	0.0000%	0.2126%
100125	13	7	6	3	0.0045%	0.0016%	0.0000%	0.0117%
100126	14	3	11	8	0.0010%	0.0002%	0.0000%	0.0049%
100199	16	3	13	11	0.0112%	0.0054%	0.0001%	0.0696%
100201	13	4	9	5	0.8542%	0.2823%	0.0006%	2.7133%
100202	13	1	12	10	1.9290%	1.0958%	0.0044%	5.5445%
100208	13	5	8	5	0.0833%	0.0909%	0.0002%	0.2134%
100210	14	4	10	8	0.1315%	0.1294%	0.0002%	0.3190%
100212	13	8	5	3	0.0214%	0.0023%	0.0009%	0.0609%
100214	13	6	7	4	0.0498%	0.0312%	0.0002%	0.1364%
100215	14	4	10	8	0.0068%	0.0013%	0.0000%	0.0211%
100299	15	2	13	12	0.2942%	0.0939%	0.0000%	1.6894%
100302	13	7	6	4	0.0950%	0.0660%	0.0000%	0.2479%
100305	14	2	12	7	0.3970%	0.0001%	0.0000%	2.7728%
100316	14	1	13	8	0.0500%	0.0062%	0.0004%	0.2391%
100318	13	7	6	3	0.0035%	0.0014%	0.0000%	0.0090%

Waste code	No of countries that				Descriptive statistical parameters			
	provided information	Does not use code	Uses Code	Provided quantities	Mean	Median	Min	Max
100320	13	8	5	2	0.0009%	0.0009%	0.0000%	0.0017%
100322	13	7	6	3	0.0002%	0.0000%	0.0000%	0.0004%
100324	13	9	4	1	0.0000%	0.0000%	0.0000%	0.0000%
100326	13	11	2	0				
100328	13	11	2	0				
100330	13	10	3	1	0.0003%	0.0003%	0.0003%	0.0003%
100399	14	2	12	11	0.0094%	0.0002%	0.0000%	0.0603%
100410	13	12	1	0				
100499	14	3	11	8	0.0052%	0.0007%	0.0000%	0.0240%
100501	13	4	9	5	0.0029%	0.0016%	0.0003%	0.0068%
100504	14	5	9	5	0.0112%	0.0020%	0.0002%	0.0444%
100509	13	11	2	1	0.0000%	0.0000%	0.0000%	0.0000%
100511	14	5	9	6	0.0046%	0.0004%	0.0001%	0.0259%
100599	14	8	6	6	0.0010%	0.0003%	0.0000%	0.0031%
100601	13	4	9	6	0.4859%	0.0009%	0.0000%	2.9066%
100602	13	6	7	4	0.0001%	0.0001%	0.0000%	0.0003%
100604	13	8	5	3	0.0000%	0.0000%	0.0000%	0.0001%
100610	13	12	1	0				
100699	14	8	6	4	0.0017%	0.0009%	0.0000%	0.0050%
100701	13	9	4	2	0.0000%	0.0000%	0.0000%	0.0000%
100702	13	9	4	2	0.0000%	0.0000%	0.0000%	0.0000%
100703	13	12	1	0				
100704	13	8	5	2	0.0000%	0.0000%	0.0000%	0.0000%
100705	13	12	1	0				
100708	13	12	1	0				
100799	13	7	6	5	0.0001%	0.0000%	0.0000%	0.0005%
100804	13	6	7	4	0.0008%	0.0006%	0.0001%	0.0017%
100809	13	4	9	5	1.5873%	0.0004%	0.0000%	7.9329%
100811	13	6	7	4	0.0001%	0.0000%	0.0000%	0.0003%
100813	13	10	3	1	0.0000%	0.0000%	0.0000%	0.0000%
100814	13	8	5	3	0.0000%	0.0000%	0.0000%	0.0000%
100816	13	7	6	3	0.2883%	0.0157%	0.0000%	0.8491%
100818	13	9	4	1	0.0000%	0.0000%	0.0000%	0.0000%
100820	13	12	1	0				
100899	14	5	9	7	0.0337%	0.0023%	0.0000%	0.2254%
100903	13	2	11	8	0.0714%	0.0581%	0.0019%	0.2280%
100906	13	4	9	6	0.0338%	0.0118%	0.0015%	0.0995%
100908	14	3	11	9	0.3086%	0.2308%	0.0006%	1.0611%
100910	13	3	10	6	0.0185%	0.0078%	0.0007%	0.0801%
100912	13	3	10	8	0.0246%	0.0183%	0.0001%	0.0716%
100914	13	9	4	3	0.0030%	0.0022%	0.0014%	0.0053%
100916	13	12	1	0				
100999	16	1	15	14	0.0487%	0.0134%	0.0000%	0.2016%
101003	13		13	9	0.0617%	0.0212%	0.0000%	0.4200%
101006	13	8	5	3	0.0040%	0.0049%	0.0013%	0.0059%
101008	13	4	9	6	0.0258%	0.0216%	0.0031%	0.0659%
101010	13	5	8	4	0.0005%	0.0005%	0.0000%	0.0011%

Waste code	No of countries that				Descriptive statistical parameters			
	provided information	Does not use code	Uses Code	Provided quantities	Mean	Median	Min	Max
101012	13	7	6	4	0.0037%	0.0028%	0.0002%	0.0091%
101014	14	11	3	2	0.0001%	0.0001%	0.0000%	0.0003%
101016	13	12	1	0				
101099	16	1	15	14	0.0208%	0.0036%	0.0000%	0.1042%
101103	14	3	11	9	0.0868%	0.0763%	0.0021%	0.2221%
101105	13	2	11	6	0.0044%	0.0004%	0.0000%	0.0168%
101110	14	3	11	6	0.0246%	0.0033%	0.0001%	0.1239%
101112	14		14	11	0.2235%	0.0372%	0.0000%	1.6516%
101114	13	3	10	6	0.0025%	0.0006%	0.0000%	0.0099%
101116	13	6	7	3	0.0003%	0.0002%	0.0002%	0.0006%
101118	13	9	4	2	0.0012%	0.0012%	0.0000%	0.0025%
101120	14	4	10	6	0.0193%	0.0021%	0.0000%	0.0896%
101199	14	1	13	12	0.0162%	0.0014%	0.0000%	0.1127%
101201	14	2	12	9	0.1320%	0.0153%	0.0020%	1.0080%
101203	14	2	12	8	0.0178%	0.0018%	0.0000%	0.0970%
101205	13	9	4	1	0.0003%	0.0003%	0.0003%	0.0003%
101206	13	1	12	7	0.0364%	0.0065%	0.0002%	0.1864%
101208	13		13	10	0.4189%	0.0752%	0.0053%	1.5362%
101210	13	7	6	3	0.0147%	0.0027%	0.0007%	0.0407%
101212	13	7	6	5	0.0014%	0.0002%	0.0000%	0.0063%
101213	13	5	8	6	0.0938%	0.0433%	0.0000%	0.4008%
101299	15	3	12	11	0.0645%	0.0084%	0.0001%	0.3950%
101301	13	3	10	7	0.0249%	0.0178%	0.0001%	0.1140%
101304	14	2	12	8	0.0224%	0.0296%	0.0005%	0.0380%
101306	13	1	12	7	0.0129%	0.0045%	0.0000%	0.0562%
101307	13	7	6	4	0.0144%	0.0014%	0.0001%	0.0546%
101310	13	8	5	2	0.0060%	0.0060%	0.0000%	0.0120%
101311	13	5	8	6	0.0292%	0.0102%	0.0007%	0.1249%
101313	13	4	9	5	0.8206%	0.0072%	0.0001%	4.0848%
101314	14	1	13	10	0.2335%	0.0842%	0.0015%	1.6537%
101399	15	2	13	12	0.0152%	0.0048%	0.0002%	0.0566%
110110	14	3	11	9	0.0076%	0.0047%	0.0000%	0.0290%
110112	14	3	11	7	0.0041%	0.0031%	0.0002%	0.0094%
110114	13	3	10	7	0.0002%	0.0001%	0.0000%	0.0006%
110199	16	2	14	14	0.0034%	0.0006%	0.0000%	0.0261%
110203	13	7	6	3	0.0000%	0.0000%	0.0000%	0.0000%
110206	13	10	3	2	0.0007%	0.0007%	0.0004%	0.0010%
110299	15	9	6	5	0.0030%	0.0000%	0.0000%	0.0110%
110501	14	2	12	9	0.0051%	0.0046%	0.0002%	0.0119%
110502	14	1	13	10	0.0042%	0.0031%	0.0005%	0.0141%
110599	15	2	13	9	0.0008%	0.0001%	0.0000%	0.0033%
120101	14		14	11	0.5894%	0.3267%	0.0111%	2.3559%
120102	14		14	11	0.6640%	0.1583%	0.0033%	4.8187%
120103	14		14	11	0.0650%	0.0266%	0.0020%	0.2850%
120104	14		14	11	0.0364%	0.0114%	0.0000%	0.1263%
120105	14	1	13	10	0.0575%	0.0145%	0.0011%	0.2682%
120113	14		14	9	0.0017%	0.0010%	0.0000%	0.0057%

Waste code	No of countries that				Descriptive statistical parameters			
	provided information	Does not use code	Uses Code	Provided quantities	Mean	Median	Min	Max
120115	14		14	10	0.0035%	0.0012%	0.0000%	0.0160%
120117	14		14	10	0.2031%	0.0402%	0.0003%	1.1306%
120121	14		14	9	0.0073%	0.0010%	0.0000%	0.0488%
120199	16		16	16	0.0922%	0.0176%	0.0000%	0.7453%
150101	14		14	11	0.5069%	0.5194%	0.0728%	0.8612%
150102	14		14	11	0.1402%	0.1349%	0.0225%	0.3602%
150103	14		14	11	0.1156%	0.0532%	0.0161%	0.3140%
150104	14		14	11	0.0557%	0.0450%	0.0098%	0.1393%
150105	14	1	13	10	0.0097%	0.0095%	0.0003%	0.0203%
150106	14		14	11	0.0876%	0.0290%	0.0085%	0.3693%
150107	14		14	11	0.1189%	0.0544%	0.0089%	0.5067%
150109	13	2	11	7	0.0027%	0.0015%	0.0004%	0.0088%
150203	14		14	11	0.0082%	0.0049%	0.0004%	0.0236%
160103	14		14	11	0.0677%	0.0527%	0.0001%	0.1823%
160106	13		13	9	0.0534%	0.0184%	0.0006%	0.2115%
160112	13	3	10	6	0.0006%	0.0003%	0.0000%	0.0018%
160115	14	1	13	8	0.0012%	0.0000%	0.0000%	0.0089%
160116	13	6	7	4	0.0000%	0.0000%	0.0000%	0.0001%
160117	14		14	11	0.2666%	0.1964%	0.0148%	0.8584%
160118	14		14	11	0.0129%	0.0050%	0.0002%	0.0315%
160119	14		14	11	0.0041%	0.0029%	0.0001%	0.0123%
160120	13		13	9	0.0061%	0.0064%	0.0001%	0.0221%
160122	13	3	10	7	0.0078%	0.0028%	0.0011%	0.0384%
160199	16	1	15	15	0.0221%	0.0023%	0.0000%	0.1617%
160214	14		14	11	0.1676%	0.0079%	0.0000%	1.7447%
160216	14		14	11	0.0087%	0.0026%	0.0001%	0.0570%
160304	14	1	13	10	0.0161%	0.0075%	0.0000%	0.0735%
160306	14		14	11	0.0690%	0.0070%	0.0006%	0.5774%
160505	13	4	9	7	0.0000%	0.0000%	0.0000%	0.0001%
160509	14	2	12	9	0.0013%	0.0002%	0.0000%	0.0057%
160604	14	1	13	10	0.0002%	0.0001%	0.0000%	0.0010%
160605	14		14	11	0.0007%	0.0002%	0.0000%	0.0026%
160799	16	2	14	13	0.0034%	0.0013%	0.0000%	0.0260%
160801	14	2	12	8	0.0004%	0.0001%	0.0000%	0.0016%
160803	14	2	12	9	0.0051%	0.0004%	0.0000%	0.0242%
160804	13	7	6	2	0.0023%	0.0023%	0.0000%	0.0047%
161002	14		14	11	0.3681%	0.0618%	0.0000%	3.1181%
161004	13	4	9	6	0.0364%	0.0042%	0.0002%	0.1937%
161102	13	4	9	6	0.0150%	0.0015%	0.0001%	0.0689%
161104	14	2	12	8	0.1122%	0.0499%	0.0000%	0.4946%
161106	14	2	12	9	0.0170%	0.0070%	0.0017%	0.0799%
170101	14		14	11	0.9710%	0.5033%	0.0023%	4.6057%
170102	14	1	13	10	0.3042%	0.0515%	0.0000%	2.5583%
170103	13	3	10	6	0.0343%	0.0093%	0.0018%	0.1075%
170107	14	1	13	10	0.7857%	0.4505%	0.0015%	2.6847%
170201	14	2	12	9	0.1528%	0.0280%	0.0012%	0.8030%
170202	14		14	10	0.0188%	0.0038%	0.0000%	0.0830%

Waste code	No of countries that				Descriptive statistical parameters			
	provided information	Does not use code	Uses Code	Provided quantities	Mean	Median	Min	Max
170203	14	1	13	10	0.0079%	0.0041%	0.0002%	0.0357%
170302	13		13	10	0.5342%	0.3325%	0.0006%	2.0289%
170401	14	1	13	10	0.0201%	0.0074%	0.0000%	0.0500%
170402	14		14	11	0.0319%	0.0212%	0.0000%	0.0727%
170403	13	1	12	7	0.0033%	0.0008%	0.0000%	0.0174%
170404	13	2	11	7	0.0015%	0.0013%	0.0000%	0.0031%
170405	14		14	11	1.0166%	0.4361%	0.0152%	3.7776%
170406	13	4	9	4	0.0001%	0.0001%	0.0000%	0.0003%
170407	14		14	11	0.0548%	0.0233%	0.0085%	0.2307%
170411	14		14	11	0.0098%	0.0058%	0.0002%	0.0295%
170504	14		14	11	3.9587%	1.5825%	0.0000%	24.3048%
170506	13	2	11	7	1.9978%	0.6503%	0.0001%	11.0160%
170508	13	4	9	5	0.0712%	0.0157%	0.0015%	0.2839%
170604	14	1	13	9	0.0470%	0.0101%	0.0002%	0.3278%
170802	14	3	11	7	0.0323%	0.0165%	0.0000%	0.1300%
170904	14		14	11	1.3063%	1.4554%	0.0069%	2.8162%
180101	14	1	13	9	0.0322%	0.0005%	0.0000%	0.2852%
180102	13	3	10	6	0.0005%	0.0006%	0.0000%	0.0011%
180104	14	1	13	9	0.0060%	0.0018%	0.0002%	0.0233%
180107	13	2	11	7	0.0001%	0.0000%	0.0000%	0.0009%
180109	13	3	10	7	0.0005%	0.0003%	0.0000%	0.0011%
180201	13	5	8	6	0.0002%	0.0000%	0.0000%	0.0010%
180203	14	2	12	7	0.0003%	0.0001%	0.0000%	0.0008%
180206	13	8	5	3	0.0000%	0.0000%	0.0000%	0.0000%
180208	14	4	10	5	0.0001%	0.0000%	0.0000%	0.0002%
190102	13	4	9	5	0.0332%	0.0027%	0.0005%	0.1359%
190112	14	1	13	10	0.2577%	0.0462%	0.0001%	1.7818%
190114	13	6	7	3	0.0224%	0.0000%	0.0000%	0.0672%
190116	13	6	7	3	0.0005%	0.0002%	0.0000%	0.0014%
190118	13	7	6	2	0.0077%	0.0077%	0.0002%	0.0151%
190119	13	9	4	1	0.0000%	0.0000%	0.0000%	0.0000%
190199	14	3	11	8	0.0647%	0.0004%	0.0000%	0.5048%
190203	13	1	12	7	0.0072%	0.0015%	0.0000%	0.0216%
190206	14	1	13	9	0.0202%	0.0088%	0.0006%	0.0838%
190210	13	9	4	1	0.0121%	0.0121%	0.0121%	0.0121%
190299	13	5	8	7	0.0599%	0.0108%	0.0030%	0.2582%
190305	13	2	11	7	0.1081%	0.0707%	0.0000%	0.2962%
190307	13	2	11	7	0.0510%	0.0020%	0.0000%	0.3140%
190401	13	10	3	2	0.0001%	0.0001%	0.0001%	0.0001%
190404	13	11	2	0				
190501	14	5	9	4	0.0290%	0.0006%	0.0000%	0.1146%
190502	13	8	5	2	0.0000%	0.0000%	0.0000%	0.0000%
190503	14	6	8	4	0.0558%	0.0203%	0.0010%	0.1816%
190599	13	3	10	8	0.0615%	0.0223%	0.0003%	0.3111%
190603	13	8	5	3	0.0007%	0.0009%	0.0003%	0.0010%
190604	13	5	8	5	0.0080%	0.0003%	0.0000%	0.0308%
190605	13	10	3	1	0.4474%	0.4474%	0.4474%	0.4474%

Waste code	No of countries that				Descriptive statistical parameters			
	provided information	Does not use code	Uses Code	Provided quantities	Mean	Median	Min	Max
190606	13	8	5	2	0.0310%	0.0310%	0.0006%	0.0613%
190699	13	8	5	5	0.0429%	0.0073%	0.0000%	0.1912%
190703	13	3	10	5	0.4153%	0.1903%	0.0029%	1.5652%
190801	14		14	10	0.0713%	0.0391%	0.0005%	0.3813%
190802	14		14	10	0.0757%	0.0484%	0.0000%	0.3015%
190805	14	1	13	9	1.5764%	1.1631%	0.0003%	6.2706%
190809	13	2	11	7	0.0348%	0.0119%	0.0024%	0.1125%
190812	14		14	11	0.3271%	0.1506%	0.0173%	1.5215%
190814	14		14	11	0.2380%	0.0547%	0.0003%	1.6278%
190899	15	2	13	13	0.3789%	0.0153%	0.0001%	4.5356%
190901	13	2	11	8	0.0671%	0.0024%	0.0000%	0.5242%
190902	13	1	12	9	0.3148%	0.0254%	0.0019%	1.5650%
190903	13	3	10	7	0.8272%	0.0727%	0.0076%	5.3543%
190904	14	3	11	6	0.0002%	0.0001%	0.0000%	0.0005%
190905	14	2	12	8	0.0012%	0.0010%	0.0001%	0.0026%
190906	14	4	10	5	0.4536%	0.1069%	0.0000%	1.6755%
190999	15	1	14	12	0.0073%	0.0017%	0.0000%	0.0521%
191001	14	1	13	10	0.2836%	0.0510%	0.0001%	1.0051%
191002	13		13	8	0.0076%	0.0065%	0.0003%	0.0235%
191004	13	3	10	6	0.0199%	0.0121%	0.0000%	0.0707%
191006	13	3	10	6	0.1272%	0.0426%	0.0001%	0.5664%
191106	13	5	8	4	0.0024%	0.0005%	0.0000%	0.0084%
191199	13	7	6	4	0.0010%	0.0000%	0.0000%	0.0041%
191201	14		14	11	0.1334%	0.0254%	0.0001%	1.1863%
191202	14		14	11	0.4106%	0.0607%	0.0005%	2.9160%
191203	14		14	11	0.0097%	0.0049%	0.0000%	0.0513%
191204	14		14	11	0.0358%	0.0137%	0.0003%	0.1220%
191205	13	1	12	9	0.0453%	0.0023%	0.0000%	0.2833%
191207	14	2	12	9	0.0621%	0.0081%	0.0001%	0.3663%
191208	13	3	10	7	0.0084%	0.0084%	0.0000%	0.0260%
191209	13	4	9	6	0.0820%	0.0405%	0.0002%	0.3140%
191210	14	6	8	6	0.1796%	0.0182%	0.0004%	0.9223%
191212	14	1	13	10	0.3728%	0.1197%	0.0020%	1.1221%
191302	13	7	6	3	0.1062%	0.0923%	0.0000%	0.2263%
191304	13	10	3	0				
191306	13	8	5	2	0.0788%	0.0788%	0.0142%	0.1433%
191308	13	8	5	2	0.0075%	0.0075%	0.0063%	0.0086%
200101	13	1	12	10	1.0539%	0.4821%	0.0419%	3.8866%
200102	13		13	10	0.0448%	0.0351%	0.0012%	0.1575%
200108	13		13	10	0.0900%	0.0301%	0.0010%	0.4147%
200110	13	2	11	7	0.0033%	0.0008%	0.0000%	0.0158%
200111	13		13	10	0.0306%	0.0047%	0.0000%	0.2257%
200125	13		13	10	0.0226%	0.0097%	0.0000%	0.0977%
200128	13	1	12	9	0.0034%	0.0002%	0.0000%	0.0262%
200130	13	1	12	8	0.0002%	0.0000%	0.0000%	0.0011%
200132	12	3	9	5	0.0009%	0.0013%	0.0000%	0.0015%
200134	13	2	11	7	0.0003%	0.0000%	0.0000%	0.0019%

Waste code	No of countries that				Descriptive statistical parameters			
	provided information	Does not use code	Uses Code	Provided quantities	Mean	Median	Min	Max
200136	13		13	10	0.0171%	0.0120%	0.0000%	0.0788%
200138	13		13	10	0.1018%	0.0294%	0.0064%	0.6228%
200139	13		13	10	0.0884%	0.0496%	0.0012%	0.3521%
200140	13		13	10	0.7191%	0.1240%	0.0129%	2.9071%
200141	12	1	11	7	0.0030%	0.0001%	0.0000%	0.0168%
200199	14	1	13	12	0.0854%	0.0098%	0.0000%	0.3625%
200201	13		13	10	0.2441%	0.1359%	0.0034%	1.2375%
200202	13		13	10	0.1091%	0.0474%	0.0000%	0.4256%
200203	13	3	10	7	0.0517%	0.0089%	0.0010%	0.2190%
200301	13		13	10	3.4052%	2.4454%	0.1164%	12.9909%
200302	12	4	8	4	0.0449%	0.0299%	0.0064%	0.1135%
200303	12		12	9	0.9184%	0.0451%	0.0003%	7.8424%
200304	13		13	10	0.3813%	0.2040%	0.0024%	1.5261%
200306	12		12	9	0.2883%	0.0393%	0.0041%	1.9832%
200307	13	1	12	9	0.0845%	0.0203%	0.0011%	0.2882%
200399	13	1	12	11	0.0801%	0.0479%	0.0016%	0.3692%

4.7 Frequency of usage and descriptive parameters of share from national amount by six-digit code from LoW - hazardous wastes

Waste code	No of countries that				Descriptive statistical parameters			
	Provided information	Does not use code	Uses code	Provided quantities	Mean	Median	Min	Max
010304	13	9	4	2	41.9191%	41.9191%	0.4742%	83.3639%
010305	14	8	6	3	28.7150%	0.3961%	0.0143%	85.7346%
010307	14	8	6	3	1.2532%	0.0138%	0.0000%	3.7460%
010407	15	8	7	5	0.0067%	0.0054%	0.0001%	0.0204%
010505	14	6	8	5	0.3290%	0.1099%	0.0016%	1.0798%
010506	14	7	7	5	0.1272%	0.0050%	0.0001%	0.4548%
020108	14	2	12	9	0.0069%	0.0053%	0.0002%	0.0220%
030104	15		15	11	0.9646%	0.0778%	0.0006%	5.7506%
030201	15	4	11	8	0.0015%	0.0014%	0.0000%	0.0032%
030202	14	7	7	4	0.0033%	0.0001%	0.0000%	0.0130%
030203	14	10	4	4	0.0017%	0.0009%	0.0001%	0.0050%
030204	13	3	10	6	0.0006%	0.0001%	0.0000%	0.0029%
030205	14	2	12	7	0.0015%	0.0001%	0.0000%	0.0086%
040103	14	8	6	4	0.0027%	0.0006%	0.0003%	0.0093%
040214	14	5	9	5	0.0075%	0.0048%	0.0000%	0.0230%
040216	15	5	10	6	0.0070%	0.0020%	0.0001%	0.0310%
040219	14	5	9	6	0.0626%	0.0153%	0.0006%	0.3050%
050102	13	7	6	4	0.1015%	0.0062%	0.0015%	0.3921%
050103	14		14	11	0.3415%	0.1435%	0.0054%	0.9847%
050104	14	10	4	2	0.0160%	0.0160%	0.0006%	0.0313%
050105	15	2	13	8	0.0698%	0.0340%	0.0000%	0.3319%
050106	15	1	14	10	0.1257%	0.1106%	0.0001%	0.3363%
050107	14	7	7	4	0.8489%	0.2915%	0.0000%	2.8125%
050108	14	4	10	7	0.0135%	0.0032%	0.0001%	0.0378%
050109	14	2	12	7	0.4313%	0.1020%	0.0165%	2.2041%
050111	14	11	3	1	0.1679%	0.1679%	0.1679%	0.1679%
050112	14	10	4	4	0.0006%	0.0001%	0.0000%	0.0022%
050115	14	5	9	7	0.0684%	0.0523%	0.0064%	0.1749%
050601	13	9	4	2	0.0108%	0.0108%	0.0000%	0.0216%
050603	14	5	9	5	0.3053%	0.0118%	0.0003%	1.2336%
050701	14	8	6	3	0.0216%	0.0000%	0.0000%	0.0649%
060101	15		15	12	0.7526%	0.0609%	0.0000%	7.0323%
060102	15	2	13	10	0.0212%	0.0107%	0.0000%	0.0809%
060103	15	6	9	7	0.0019%	0.0009%	0.0000%	0.0083%
060104	15	3	12	9	0.0051%	0.0012%	0.0000%	0.0287%
060105	15	2	13	10	0.0088%	0.0036%	0.0000%	0.0411%
060106	15		15	12	0.0914%	0.0209%	0.0000%	0.4353%
060201	14	5	9	7	0.7275%	0.0169%	0.0000%	4.6358%
060203	15	3	12	8	0.0052%	0.0021%	0.0001%	0.0172%
060204	15	1	14	11	0.2816%	0.0741%	0.0000%	1.3397%
060205	15	1	14	12	0.0779%	0.0150%	0.0000%	0.3468%
060311	15	4	11	9	0.0110%	0.0028%	0.0003%	0.0744%

Waste code	No of countries that				Descriptive statistical parameters			
	Provided information	Does not use code	Uses code	Provided quantities	Mean	Median	Min	Max
060313	15		15	12	0.8512%	0.0047%	0.0000%	10.0853%
060315	14	5	9	7	0.0119%	0.0072%	0.0000%	0.0323%
060403	14	7	7	4	0.0056%	0.0053%	0.0005%	0.0113%
060404	15		15	12	0.0240%	0.0069%	0.0000%	0.1923%
060405	15		15	12	0.0349%	0.0182%	0.0000%	0.1245%
060502	15		15	12	0.2353%	0.0302%	0.0007%	1.7122%
060602	15	6	9	6	0.0446%	0.0028%	0.0001%	0.2575%
060701	13	9	4	2	0.0014%	0.0014%	0.0003%	0.0025%
060702	14	8	6	4	0.0002%	0.0002%	0.0001%	0.0004%
060703	13	10	3	1	0.2596%	0.2596%	0.2596%	0.2596%
060704	14	10	4	3	0.0005%	0.0000%	0.0000%	0.0015%
060802	14	9	5	3	0.0001%	0.0001%	0.0001%	0.0001%
060903	14	11	3	2	0.0001%	0.0001%	0.0000%	0.0002%
061002	14	5	9	5	0.0076%	0.0010%	0.0000%	0.0253%
061301	15	6	9	6	0.0013%	0.0005%	0.0000%	0.0034%
061302	15	4	11	8	0.0122%	0.0028%	0.0000%	0.0709%
061304	14	7	7	4	0.0102%	0.0028%	0.0000%	0.0349%
061305	14	8	6	3	0.0005%	0.0006%	0.0000%	0.0008%
070101	15	3	12	10	0.2794%	0.0162%	0.0001%	1.3737%
070103	15	3	12	8	0.0290%	0.0052%	0.0001%	0.1148%
070104	15		15	12	0.4805%	0.0260%	0.0000%	4.7755%
070107	14	5	9	6	0.3155%	0.0446%	0.0002%	1.0413%
070108	14	2	12	8	0.2086%	0.0697%	0.0202%	0.9439%
070109	14	7	7	5	0.0263%	0.0043%	0.0004%	0.1195%
070110	14	2	12	10	0.0446%	0.0355%	0.0003%	0.1276%
070111	14	5	9	6	0.0998%	0.0268%	0.0002%	0.4743%
070201	15	4	11	8	0.2342%	0.0118%	0.0002%	1.7038%
070203	15	4	11	7	0.0086%	0.0075%	0.0001%	0.0188%
070204	15	3	12	8	0.0354%	0.0204%	0.0013%	0.0919%
070207	14	6	8	6	0.0139%	0.0036%	0.0001%	0.0471%
070208	15	2	13	9	0.1267%	0.1072%	0.0006%	0.3637%
070209	15	5	10	7	0.0075%	0.0031%	0.0000%	0.0258%
070210	15	5	10	7	0.0333%	0.0069%	0.0000%	0.1880%
070211	14	4	10	7	0.0214%	0.0157%	0.0021%	0.0646%
070214	14	3	11	7	0.0233%	0.0207%	0.0000%	0.0613%
070216	14	6	8	4	0.0058%	0.0016%	0.0002%	0.0197%
070301	14	2	12	8	0.0421%	0.0020%	0.0000%	0.3139%
070303	14	6	8	5	0.0011%	0.0013%	0.0000%	0.0022%
070304	15	1	14	10	0.3499%	0.0152%	0.0016%	2.3769%
070307	14	8	6	4	0.0090%	0.0048%	0.0002%	0.0262%
070308	14	4	10	6	0.0104%	0.0028%	0.0003%	0.0478%
070309	14	9	5	3	0.0007%	0.0007%	0.0001%	0.0012%
070310	14	7	7	4	0.0181%	0.0099%	0.0003%	0.0524%
070311	14	7	7	5	0.0052%	0.0045%	0.0014%	0.0122%
070401	15	3	12	9	0.0765%	0.0098%	0.0012%	0.4007%
070403	14	6	8	6	0.0898%	0.0239%	0.0000%	0.3601%
070404	15	3	12	9	0.0149%	0.0006%	0.0000%	0.1096%

Waste code	No of countries that				Descriptive statistical parameters			
	Provided information	Does not use code	Uses code	Provided quantities	Mean	Median	Min	Max
070407	14	7	7	5	0.0040%	0.0028%	0.0003%	0.0096%
070408	14	7	7	5	0.0064%	0.0035%	0.0002%	0.0161%
070409	14	7	7	4	0.0019%	0.0012%	0.0000%	0.0051%
070410	14	8	6	3	0.0004%	0.0004%	0.0000%	0.0008%
070411	14	7	7	4	0.0033%	0.0026%	0.0018%	0.0062%
070413	15	3	12	8	0.0406%	0.0039%	0.0002%	0.2830%
070501	15	3	12	9	1.0962%	0.0396%	0.0048%	7.9396%
070503	15	2	13	10	0.3416%	0.1204%	0.0010%	2.0457%
070504	15	2	13	11	1.6419%	0.4130%	0.0001%	7.7309%
070507	15	4	11	8	0.0379%	0.0015%	0.0000%	0.2102%
070508	15	4	11	9	0.1005%	0.0189%	0.0011%	0.3161%
070509	15	7	8	4	0.0004%	0.0004%	0.0000%	0.0009%
070510	15	3	12	8	0.0833%	0.0201%	0.0005%	0.4449%
070511	15	5	10	7	0.0641%	0.0191%	0.0006%	0.2973%
070513	15	1	14	11	0.1464%	0.0096%	0.0000%	0.8913%
070601	15	2	13	9	1.4436%	0.0092%	0.0005%	12.1839%
070603	14	4	10	6	0.0049%	0.0020%	0.0000%	0.0137%
070604	15	3	12	10	0.0131%	0.0068%	0.0000%	0.0716%
070607	14	6	8	5	0.0066%	0.0032%	0.0000%	0.0222%
070608	15	5	10	8	0.0406%	0.0091%	0.0000%	0.1467%
070609	14	9	5	3	0.0008%	0.0001%	0.0000%	0.0023%
070610	14	7	7	5	0.0317%	0.0181%	0.0032%	0.0994%
070611	14	4	10	6	0.0548%	0.0091%	0.0002%	0.2792%
070701	15	4	11	8	0.2480%	0.0153%	0.0011%	1.6287%
070703	14	3	11	7	0.0563%	0.0047%	0.0001%	0.3752%
070704	15		15	11	0.1093%	0.0094%	0.0001%	1.0488%
070707	14	5	9	5	0.0129%	0.0009%	0.0000%	0.0544%
070708	14	3	11	8	0.1583%	0.0267%	0.0000%	1.0518%
070709	14	8	6	3	0.0016%	0.0003%	0.0002%	0.0042%
070710	14	6	8	6	0.0466%	0.0107%	0.0006%	0.1738%
070711	14	7	7	3	0.1825%	0.0035%	0.0006%	0.5435%
080111	15		15	12	0.4020%	0.3122%	0.0157%	2.0168%
080113	15	1	14	12	0.2089%	0.0693%	0.0000%	0.8105%
080115	15	2	13	10	0.1082%	0.0771%	0.0001%	0.4712%
080117	15	1	14	11	0.0550%	0.0314%	0.0003%	0.2414%
080119	15	2	13	9	0.0885%	0.0301%	0.0088%	0.2491%
080121	15	1	14	9	0.0615%	0.0090%	0.0000%	0.4847%
080312	15	1	14	11	0.1552%	0.0323%	0.0007%	1.3712%
080314	15	3	12	9	0.0305%	0.0207%	0.0013%	0.0976%
080316	13	6	7	5	0.0010%	0.0002%	0.0000%	0.0039%
080317	14	2	12	8	0.0179%	0.0080%	0.0007%	0.0618%
080319	14	11	3	2	0.0009%	0.0009%	0.0007%	0.0012%
080409	15	2	13	10	0.0829%	0.0725%	0.0000%	0.1640%
080411	14	3	11	7	0.0084%	0.0041%	0.0009%	0.0334%
080413	15	4	11	8	0.0191%	0.0187%	0.0007%	0.0443%
080415	15	1	14	11	0.0115%	0.0118%	0.0006%	0.0245%
080417	14	10	4	3	0.0063%	0.0006%	0.0003%	0.0181%

Waste code	No of countries that				Descriptive statistical parameters			
	Provided information	Does not use code	Uses code	Provided quantities	Mean	Median	Min	Max
080501	14	2	12	9	0.0039%	0.0020%	0.0000%	0.0160%
090101	15	1	14	11	0.0510%	0.0492%	0.0002%	0.1523%
090102	15	1	14	11	0.0203%	0.0141%	0.0000%	0.0771%
090103	15		15	11	0.0082%	0.0024%	0.0000%	0.0487%
090104	15		15	12	0.0531%	0.0450%	0.0002%	0.1797%
090105	14	1	13	9	0.0369%	0.0158%	0.0009%	0.1529%
090106	14	1	13	11	0.0050%	0.0004%	0.0000%	0.0388%
090111	14	8	6	3	0.0001%	0.0000%	0.0000%	0.0002%
090113	14	6	8	5	0.0079%	0.0010%	0.0000%	0.0335%
100104	15	3	12	8	0.0315%	0.0071%	0.0016%	0.1071%
100109	14	6	8	5	0.0067%	0.0003%	0.0000%	0.0263%
100113	14	7	7	4	0.0070%	0.0009%	0.0001%	0.0260%
100114	15	3	12	8	0.0652%	0.0043%	0.0001%	0.3192%
100116	14	8	6	4	0.0469%	0.0249%	0.0000%	0.1380%
100118	14	8	6	4	0.1981%	0.0254%	0.0000%	0.7416%
100120	14	5	9	5	0.0562%	0.0082%	0.0000%	0.2521%
100122	15	4	11	9	0.0287%	0.0112%	0.0000%	0.1652%
100207	14	2	12	9	3.7442%	2.0713%	0.1417%	16.6327%
100211	14	7	7	4	7.6717%	0.9465%	0.1167%	28.6770%
100213	14	7	7	5	2.7773%	0.5683%	0.0000%	11.9394%
100304	14	4	10	7	0.3098%	0.0282%	0.0004%	1.9477%
100308	14	6	8	4	1.6709%	0.9481%	0.0054%	4.7819%
100309	14	9	5	3	0.4901%	0.5377%	0.0087%	0.9239%
100315	14	9	5	2	0.0854%	0.0854%	0.0443%	0.1265%
100317	14	9	5	3	0.0242%	0.0218%	0.0045%	0.0462%
100319	14	5	9	6	0.0563%	0.0153%	0.0002%	0.2301%
100321	14	6	8	4	0.0429%	0.0370%	0.0055%	0.0922%
100323	14	6	8	6	0.0214%	0.0068%	0.0000%	0.0995%
100325	14	9	5	2	0.0585%	0.0585%	0.0296%	0.0873%
100327	14	9	5	2	0.0032%	0.0032%	0.0007%	0.0056%
100329	14	11	3	3	2.8593%	0.5461%	0.3049%	7.7269%
100401	14	2	12	9	0.9642%	0.4005%	0.0024%	3.5354%
100402	15	4	11	9	0.1783%	0.0577%	0.0199%	0.5822%
100403	13	12	1	0				
100404	14	7	7	4	0.0504%	0.0498%	0.0017%	0.1003%
100405	14	5	9	7	0.1131%	0.0081%	0.0010%	0.6549%
100406	14	7	7	5	0.2085%	0.0156%	0.0001%	0.9937%
100407	13	8	5	3	0.0250%	0.0331%	0.0007%	0.0413%
100409	13	13	0	0				
100503	14	7	7	5	0.0493%	0.0245%	0.0018%	0.1304%
100505	14	9	5	2	0.0006%	0.0006%	0.0001%	0.0011%
100506	14	6	8	6	0.3776%	0.0256%	0.0000%	1.6242%
100508	13	11	2	1	0.0000%	0.0000%	0.0000%	0.0000%
100510	14	10	4	3	0.0020%	0.0003%	0.0003%	0.0053%
100603	14	7	7	5	0.2029%	0.0443%	0.0029%	0.7249%
100606	14	9	5	3	0.3120%	0.0005%	0.0000%	0.9356%
100607	13	9	4	2	1.4419%	1.4419%	0.0000%	2.8837%

Waste code	No of countries that				Descriptive statistical parameters			
	Provided information	Does not use code	Uses code	Provided quantities	Mean	Median	Min	Max
100609	13	12	1	0				
100707	13	12	1	0				
100808	14	8	6	4	0.0350%	0.0272%	0.0011%	0.0847%
100810	14	10	4	2	0.0004%	0.0004%	0.0000%	0.0009%
100812	13	13	0	0				
100815	13	9	4	2	0.0060%	0.0060%	0.0004%	0.0117%
100817	13	9	4	2	0.0083%	0.0083%	0.0000%	0.0165%
100819	13	11	2	1	0.0027%	0.0027%	0.0027%	0.0027%
100905	14	6	8	6	0.1773%	0.1153%	0.0051%	0.5765%
100907	14	5	9	7	0.6770%	0.0383%	0.0000%	3.1718%
100909	14	6	8	5	0.1149%	0.0128%	0.0053%	0.5171%
100911	14	6	8	4	0.0096%	0.0073%	0.0001%	0.0237%
100913	14	9	5	3	0.0031%	0.0044%	0.0001%	0.0048%
100915	14	12	2	2	0.0024%	0.0024%	0.0000%	0.0048%
101005	14	6	8	6	0.0205%	0.0013%	0.0002%	0.0903%
101007	14	8	6	4	0.1249%	0.1240%	0.0083%	0.2432%
101009	14	6	8	4	0.0165%	0.0043%	0.0013%	0.0562%
101011	14	9	5	2	0.0022%	0.0022%	0.0006%	0.0038%
101013	14	8	6	5	0.0005%	0.0001%	0.0000%	0.0018%
101015	14	11	3	2	0.0100%	0.0100%	0.0002%	0.0198%
101109	15	5	10	7	0.0068%	0.0025%	0.0005%	0.0209%
101111	14	5	9	6	0.0624%	0.0313%	0.0000%	0.2547%
101113	15	6	9	7	0.0548%	0.0084%	0.0001%	0.3123%
101115	14	4	10	7	0.0379%	0.0260%	0.0003%	0.1458%
101117	14	10	4	3	0.0232%	0.0019%	0.0003%	0.0674%
101119	15	7	8	6	0.0263%	0.0051%	0.0003%	0.0988%
101209	14	8	6	4	0.0462%	0.0379%	0.0004%	0.1084%
101211	14	7	7	4	0.0059%	0.0020%	0.0004%	0.0193%
101309	15	6	9	6	0.0262%	0.0018%	0.0000%	0.1308%
101312	14	8	6	4	0.1161%	0.0444%	0.0009%	0.3748%
101401	13	10	3	0				
110105	15		15	12	0.8216%	0.2864%	0.0001%	5.1666%
110106	15	3	12	10	0.0959%	0.0461%	0.0023%	0.3511%
110107	15	2	13	10	0.1495%	0.0868%	0.0022%	0.3555%
110108	15	3	12	10	0.0365%	0.0206%	0.0005%	0.1775%
110109	15	2	13	10	0.4070%	0.2393%	0.0161%	1.8279%
110111	15		15	12	1.4089%	0.1329%	0.0000%	9.9210%
110113	15	1	14	11	0.1869%	0.0492%	0.0017%	1.1094%
110115	15	7	8	6	0.0062%	0.0010%	0.0000%	0.0257%
110116	15	4	11	9	0.0007%	0.0003%	0.0000%	0.0038%
110198	15	1	14	11	0.1602%	0.0480%	0.0021%	0.9923%
110202	15	6	9	6	3.0548%	0.3739%	0.0017%	11.9546%
110205	14	8	6	3	0.0190%	0.0029%	0.0016%	0.0526%
110207	15	6	9	6	0.1919%	0.0077%	0.0001%	1.0880%
110301	15	5	10	8	0.0033%	0.0028%	0.0001%	0.0089%
110302	15	1	14	10	3.0011%	0.0083%	0.0000%	29.8254%
110503	14	6	8	6	0.0061%	0.0021%	0.0001%	0.0272%

Waste code	No of countries that				Descriptive statistical parameters			
	Provided information	Does not use code	Uses code	Provided quantities	Mean	Median	Min	Max
110504	15	4	11	6	0.0203%	0.0064%	0.0008%	0.0625%
120106	14	4	10	8	0.0030%	0.0010%	0.0002%	0.0153%
120107	15	1	14	10	0.0362%	0.0125%	0.0002%	0.1390%
120108	15	4	11	7	0.0125%	0.0175%	0.0010%	0.0284%
120109	15		15	12	1.3487%	1.0540%	0.0000%	3.5886%
120110	15	2	13	9	0.0216%	0.0029%	0.0004%	0.1207%
120112	15	4	11	9	0.0337%	0.0138%	0.0003%	0.1219%
120114	15		15	12	0.0741%	0.0219%	0.0000%	0.3416%
120116	15	3	12	10	0.1476%	0.0128%	0.0002%	0.8724%
120118	15	2	13	10	0.1962%	0.0832%	0.0000%	0.9960%
120119	14	4	10	6	0.0028%	0.0014%	0.0001%	0.0082%
120120	15	2	13	9	0.0331%	0.0155%	0.0000%	0.1617%
120301	15	4	11	8	0.5269%	0.3297%	0.0003%	1.5991%
120302	15	6	9	6	0.0448%	0.0068%	0.0002%	0.2437%
130101	15	3	12	7	0.0048%	0.0020%	0.0003%	0.0163%
130104	15	6	9	6	0.0006%	0.0003%	0.0000%	0.0026%
130105	15	1	14	10	0.0631%	0.0314%	0.0002%	0.1845%
130109	15	3	12	9	0.0009%	0.0004%	0.0001%	0.0046%
130110	15		15	11	0.0612%	0.0418%	0.0003%	0.1759%
130111	15		15	11	0.0224%	0.0048%	0.0000%	0.1895%
130112	14	5	9	6	0.0010%	0.0003%	0.0001%	0.0044%
130113	15		15	11	0.0780%	0.0358%	0.0056%	0.4926%
130204	15		15	12	0.0117%	0.0102%	0.0000%	0.0234%
130205	15		15	12	1.1828%	0.5172%	0.0030%	4.1212%
130206	15		15	11	0.1343%	0.1099%	0.0036%	0.3496%
130207	14	2	12	9	0.0060%	0.0022%	0.0005%	0.0203%
130208	15		15	12	1.0888%	0.4653%	0.0181%	5.2483%
130301	14	1	13	10	0.0097%	0.0020%	0.0000%	0.0413%
130306	15	4	11	7	0.0043%	0.0003%	0.0001%	0.0220%
130307	15		15	12	0.0412%	0.0318%	0.0016%	0.1277%
130308	15	4	11	9	0.0035%	0.0034%	0.0001%	0.0091%
130309	15	9	6	4	0.0003%	0.0001%	0.0000%	0.0009%
130310	15		15	11	0.0418%	0.0079%	0.0007%	0.3336%
130401	13	1	12	8	1.0311%	0.0020%	0.0007%	4.5938%
130402	13	6	7	5	0.2032%	0.0305%	0.0004%	0.7147%
130403	14	1	13	10	1.3287%	0.1901%	0.0001%	6.9287%
130501	15	1	14	11	1.8629%	0.0819%	0.0011%	19.6912%
130502	15	1	14	10	1.8873%	0.2968%	0.0041%	11.9604%
130503	15	2	13	9	0.7869%	0.0661%	0.0034%	4.5757%
130506	15		15	11	0.6617%	0.1458%	0.0009%	4.7905%
130507	15		15	11	1.7784%	0.7763%	0.0054%	6.3602%
130508	15		15	12	0.8569%	0.1337%	0.0000%	5.6125%
130701	15		15	12	0.3437%	0.0269%	0.0005%	2.1584%
130702	15	2	13	8	0.0025%	0.0023%	0.0000%	0.0049%
130703	15	1	14	10	0.0879%	0.0316%	0.0149%	0.2731%
130801	14	6	8	5	0.0003%	0.0001%	0.0000%	0.0006%
130802	15	1	14	11	0.2308%	0.0556%	0.0006%	1.7992%

Waste code	No of countries that				Descriptive statistical parameters			
	Provided information	Does not use code	Uses code	Provided quantities	Mean	Median	Min	Max
130899	17		17	17	0.2914%	0.0970%	0.0000%	1.5469%
140601	14	2	12	9	0.0092%	0.0011%	0.0000%	0.0653%
140602	15		15	11	0.0215%	0.0029%	0.0000%	0.1030%
140603	15		15	11	0.2578%	0.0909%	0.0002%	1.4571%
140604	14	2	12	9	0.0150%	0.0075%	0.0006%	0.0623%
140605	15	1	14	12	0.0276%	0.0128%	0.0000%	0.1079%
150110	15		15	12	0.4336%	0.1566%	0.0057%	1.3728%
150111	15	2	13	10	0.0090%	0.0042%	0.0000%	0.0241%
150202	15		15	12	0.6489%	0.4423%	0.0068%	2.0209%
160104	15		15	12	0.3762%	0.0773%	0.0010%	2.6821%
160107	15		15	12	0.1463%	0.0607%	0.0004%	0.5918%
160108	14	5	9	5	0.0001%	0.0002%	0.0000%	0.0002%
160109	14	3	11	6	0.0003%	0.0002%	0.0000%	0.0011%
160110	14	5	9	5	0.0002%	0.0002%	0.0001%	0.0006%
160111	14	1	13	10	0.0044%	0.0008%	0.0000%	0.0322%
160113	15		15	12	0.0037%	0.0002%	0.0000%	0.0206%
160114	14		14	11	0.0299%	0.0199%	0.0000%	0.1317%
160121	14	3	11	8	0.0231%	0.0025%	0.0007%	0.1521%
160209	15	1	14	11	0.0651%	0.0099%	0.0003%	0.3701%
160210	14	4	10	8	0.0157%	0.0007%	0.0001%	0.1129%
160211	15	3	12	9	0.0102%	0.0026%	0.0002%	0.0580%
160212	14	5	9	5	0.0037%	0.0002%	0.0000%	0.0140%
160213	15		15	12	0.0915%	0.0736%	0.0005%	0.3339%
160215	15	2	13	10	0.0177%	0.0042%	0.0000%	0.1242%
160303	15		15	12	0.1218%	0.0071%	0.0003%	1.1681%
160305	15		15	11	0.0487%	0.0295%	0.0002%	0.1317%
160401	14	2	12	8	0.0003%	0.0002%	0.0000%	0.0009%
160402	14	8	6	4	0.0031%	0.0000%	0.0000%	0.0124%
160403	14	3	11	8	0.0055%	0.0034%	0.0002%	0.0135%
160504	15	3	12	10	0.0151%	0.0081%	0.0000%	0.0593%
160506	15		15	12	0.0215%	0.0111%	0.0002%	0.0882%
160507	15	1	14	11	0.0120%	0.0050%	0.0000%	0.0378%
160508	15		15	12	0.0123%	0.0082%	0.0000%	0.0551%
160601	15		15	12	0.9050%	0.5921%	0.0361%	3.2195%
160602	15		15	11	0.0218%	0.0193%	0.0001%	0.0881%
160603	15	2	13	9	0.0131%	0.0009%	0.0000%	0.1022%
160606	15	1	14	11	0.0601%	0.0050%	0.0000%	0.4396%
160708	15		15	12	1.9337%	0.7719%	0.0021%	8.9137%
160709	15	1	14	11	0.0702%	0.0325%	0.0022%	0.2551%
160802	15	2	13	10	0.0828%	0.0298%	0.0007%	0.2366%
160805	14	8	6	4	0.0037%	0.0026%	0.0013%	0.0082%
160806	14	9	5	3	0.0017%	0.0001%	0.0000%	0.0051%
160807	15	3	12	10	0.0320%	0.0134%	0.0000%	0.1647%
160901	14	7	7	4	0.0002%	0.0002%	0.0000%	0.0004%
160902	15	4	11	7	0.0005%	0.0001%	0.0000%	0.0016%
160903	15	4	11	7	0.0012%	0.0003%	0.0000%	0.0054%
160904	15	4	11	8	0.0013%	0.0003%	0.0000%	0.0083%

Waste code	No of countries that				Descriptive statistical parameters			
	Provided information	Does not use code	Uses code	Provided quantities	Mean	Median	Min	Max
161001	15		15	11	0.8324%	0.1470%	0.0054%	4.0016%
161003	15	4	11	6	0.0156%	0.0016%	0.0001%	0.0834%
161101	14	5	9	7	0.4894%	0.1678%	0.0104%	2.0142%
161103	14	5	9	7	0.0629%	0.0244%	0.0014%	0.2127%
161105	15	5	10	8	0.0281%	0.0252%	0.0001%	0.0744%
170106	14	2	12	8	0.6764%	0.2346%	0.0001%	2.0070%
170204	15	1	14	11	0.3777%	0.0796%	0.0006%	2.1866%
170301	14	3	11	7	4.4874%	0.0763%	0.0005%	25.2385%
170303	14	3	11	8	0.0506%	0.0010%	0.0000%	0.3889%
170409	15	4	11	9	0.1550%	0.0382%	0.0008%	0.6693%
170410	14	5	9	6	0.0047%	0.0036%	0.0000%	0.0132%
170503	15		15	12	3.4115%	0.6044%	0.0049%	17.7645%
170505	14	4	10	6	0.0330%	0.0130%	0.0001%	0.1388%
170507	15	6	9	5	0.3418%	0.0010%	0.0001%	1.7043%
170601	15		15	11	0.0518%	0.0243%	0.0022%	0.1871%
170603	14	4	10	6	0.0170%	0.0042%	0.0003%	0.0719%
170605	15		15	12	0.7836%	0.0891%	0.0031%	4.4553%
170801	14	7	7	5	0.0295%	0.0004%	0.0001%	0.1436%
170901	14	6	8	4	0.3024%	0.0540%	0.0001%	1.1017%
170902	14	4	10	5	0.0027%	0.0012%	0.0000%	0.0082%
170903	14	3	11	8	0.9621%	0.0715%	0.0013%	7.2900%
180103	15	1	14	11	0.5061%	0.3386%	0.0004%	1.2967%
180106	14	1	13	10	0.0166%	0.0056%	0.0003%	0.0702%
180108	14	3	11	6	0.0044%	0.0025%	0.0000%	0.0178%
180110	13	4	9	7	0.0001%	0.0000%	0.0000%	0.0002%
180202	15	2	13	10	0.4957%	0.0129%	0.0000%	3.6762%
180205	15	3	12	7	0.0009%	0.0008%	0.0000%	0.0023%
180207	13	8	5	3	0.0021%	0.0000%	0.0000%	0.0063%
190105	14	6	8	5	0.1149%	0.0027%	0.0002%	0.4929%
190106	14	5	9	7	0.0609%	0.0158%	0.0058%	0.1981%
190107	15	3	12	9	0.6572%	0.2674%	0.0001%	2.9370%
190110	15	7	8	5	0.0018%	0.0019%	0.0009%	0.0024%
190111	15	3	12	9	0.6288%	0.3553%	0.0000%	2.1655%
190113	14	4	10	7	1.0050%	0.1784%	0.0000%	4.6125%
190115	14	4	10	6	0.0077%	0.0014%	0.0000%	0.0340%
190117	14	6	8	6	0.0890%	0.0079%	0.0003%	0.4937%
190204	14	5	9	6	0.0690%	0.0150%	0.0001%	0.2995%
190205	15	1	14	11	0.4966%	0.1431%	0.0083%	1.7256%
190207	14	1	13	9	0.0256%	0.0048%	0.0008%	0.1383%
190208	14	6	8	5	0.0740%	0.0198%	0.0014%	0.2139%
190209	14	8	6	4	0.1296%	0.0307%	0.0000%	0.4568%
190211	14	5	9	5	0.0627%	0.0016%	0.0001%	0.3076%
190304	14	4	10	8	0.6540%	0.0721%	0.0000%	2.4621%
190306	14	5	9	6	0.1431%	0.0126%	0.0002%	0.7967%
190402	14	10	4	2	0.2103%	0.2103%	0.0026%	0.4179%
190403	13	10	3	1	0.0209%	0.0209%	0.0209%	0.0209%
190702	14	6	8	3	0.3970%	0.5178%	0.0245%	0.6488%

Waste code	No of countries that				Descriptive statistical parameters			
	Provided information	Does not use code	Uses code	Provided quantities	Mean	Median	Min	Max
190806	14	5	9	7	0.0046%	0.0032%	0.0002%	0.0120%
190807	14	7	7	5	0.0288%	0.0027%	0.0000%	0.1354%
190808	14	7	7	4	0.0070%	0.0075%	0.0004%	0.0123%
190810	14	1	13	8	0.1738%	0.1169%	0.0001%	0.4900%
190811	14	1	13	9	0.5801%	0.1144%	0.0086%	3.1792%
190813	15	1	14	11	1.4334%	0.3489%	0.0000%	5.8373%
191003	14	6	8	4	1.0536%	0.8231%	0.0000%	2.5680%
191005	14	7	7	2	0.0302%	0.0302%	0.0018%	0.0587%
191101	13	5	8	4	0.1937%	0.0813%	0.0007%	0.6115%
191102	14	11	3	1	0.0001%	0.0001%	0.0001%	0.0001%
191103	14	7	7	5	2.6626%	0.0588%	0.0008%	12.9943%
191104	14	12	2	1	0.0004%	0.0004%	0.0004%	0.0004%
191105	14	8	6	3	0.0102%	0.0104%	0.0043%	0.0157%
191107	14	12	2	1	0.0257%	0.0257%	0.0257%	0.0257%
191206	14	4	10	7	0.0029%	0.0003%	0.0000%	0.0157%
191211	15	3	12	10	0.8734%	0.0125%	0.0000%	7.4092%
191301	14	4	10	7	0.5276%	0.4333%	0.0002%	1.4344%
191303	14	8	6	3	0.0014%	0.0015%	0.0002%	0.0026%
191305	13	8	5	3	0.6178%	0.8278%	0.0010%	1.0245%
191307	13	7	6	4	0.0213%	0.0114%	0.0007%	0.0618%
200113	14	1	13	9	0.0174%	0.0024%	0.0002%	0.0785%
200114	14	1	13	9	0.0059%	0.0014%	0.0001%	0.0428%
200115	14	3	11	8	0.0159%	0.0159%	0.0000%	0.0378%
200117	13	1	12	9	0.0242%	0.0005%	0.0001%	0.1615%
200119	14	1	13	10	0.0080%	0.0008%	0.0000%	0.0506%
200121	14		14	11	0.0926%	0.0320%	0.0008%	0.5346%
200123	14	2	12	9	0.0344%	0.0063%	0.0000%	0.2010%
200126	14	2	12	10	0.2714%	0.0052%	0.0008%	1.7724%
200127	14		14	11	0.1673%	0.0150%	0.0002%	1.5307%
200129	13	3	10	7	0.0103%	0.0023%	0.0000%	0.0579%
200131	14	3	11	7	0.0099%	0.0002%	0.0000%	0.0668%
200133	14		14	11	0.1100%	0.0087%	0.0004%	0.9136%
200135	14		14	11	0.2064%	0.0208%	0.0006%	1.9684%
200137	13	1	12	9	0.0407%	0.0055%	0.0000%	0.1823%

4.8 Frequency of usage and descriptive parameters of share from national amount by six-digit code from LoW - 99-codes

Waste code	No of countries that				Descriptive statistical parameters			
	Provided information	Does not use code	Uses Code	Provided quantities	Mean	Median	Min	Max
010399	15	4	11	9	0.5374%	0.0020%	0.0000%	4.4409%
010499	14	3	11	10	0.2176%	0.0148%	0.0000%	1.8278%
010599	14	5	9	8	0.0803%	0.0069%	0.0001%	0.5790%
020199	14		14	13	0.0172%	0.0141%	0.0002%	0.0528%
020299	16		16	14	0.1553%	0.0526%	0.0003%	1.1056%
020399	16	1	15	14	0.1545%	0.0592%	0.0000%	1.0369%
020499	15	2	13	12	0.9230%	0.0179%	0.0002%	8.5180%
020599	15		15	14	0.3403%	0.0254%	0.0000%	3.9926%
020699	15	2	13	12	0.0040%	0.0016%	0.0001%	0.0199%
020799	16		16	14	0.1340%	0.0495%	0.0000%	0.6969%
030199	16	1	15	14	0.1135%	0.0156%	0.0002%	0.5117%
030299	14	6	8	6	0.0081%	0.0000%	0.0000%	0.0483%
030399	14	2	12	11	0.1855%	0.0117%	0.0015%	1.3730%
040199	15	1	14	12	0.0258%	0.0016%	0.0000%	0.2206%
040299	16		16	13	0.1287%	0.0033%	0.0002%	1.6198%
050199	15	4	11	11	0.0046%	0.0009%	0.0000%	0.0178%
050699	14	7	7	6	0.0495%	0.0002%	0.0000%	0.2948%
050799	14	5	9	7	0.0113%	0.0001%	0.0000%	0.0588%
060199	14	2	12	11	0.0061%	0.0014%	0.0000%	0.0281%
060299	16	4	12	12	0.0048%	0.0012%	0.0000%	0.0182%
060399	15	2	13	11	0.0109%	0.0003%	0.0000%	0.0898%
060499	15	4	11	9	0.0010%	0.0001%	0.0000%	0.0033%
060699	14	6	8	6	0.0083%	0.0001%	0.0001%	0.0344%
060799	13	8	5	3	0.0041%	0.0017%	0.0000%	0.0104%
060899	15	4	11	10	0.0151%	0.0003%	0.0000%	0.1406%
060999	14	8	6	5	7.6421%	0.0010%	0.0000%	38.1950%
061099	15	5	10	7	0.0015%	0.0000%	0.0000%	0.0100%
061199	15	6	9	9	0.0948%	0.0078%	0.0001%	0.6196%
061399	16	3	13	12	0.0071%	0.0008%	0.0000%	0.0591%
070199	16		16	15	0.0388%	0.0024%	0.0000%	0.2651%
070299	16		16	16	0.0290%	0.0071%	0.0003%	0.1405%
070399	14	5	9	8	0.0009%	0.0004%	0.0000%	0.0034%
070499	14	4	10	7	0.0000%	0.0000%	0.0000%	0.0001%
070599	16	3	13	11	0.0060%	0.0022%	0.0000%	0.0410%
070699	15	2	13	12	0.0030%	0.0017%	0.0000%	0.0093%
070799	15	2	13	12	0.0151%	0.0012%	0.0000%	0.1661%
080199	15	1	14	13	0.0019%	0.0006%	0.0000%	0.0108%
080299	15	3	12	10	0.0024%	0.0009%	0.0000%	0.0122%
080399	14	4	10	8	0.0015%	0.0003%	0.0000%	0.0105%
080499	14	3	11	11	0.0012%	0.0009%	0.0000%	0.0031%
090199	15	3	12	9	0.0005%	0.0004%	0.0000%	0.0011%
100199	16	3	13	11	0.0112%	0.0054%	0.0001%	0.0696%

Waste code	No of countries that				Descriptive statistical parameters			
	Provided information	Does not use code	Uses Code	Provided quantities	Mean	Median	Min	Max
100299	15	2	13	12	0.2942%	0.0939%	0.0000%	1.6894%
100399	14	2	12	11	0.0094%	0.0002%	0.0000%	0.0603%
100499	14	3	11	8	0.0052%	0.0007%	0.0000%	0.0240%
100599	14	8	6	6	0.0010%	0.0003%	0.0000%	0.0031%
100699	14	8	6	4	0.0017%	0.0009%	0.0000%	0.0050%
100799	13	7	6	5	0.0001%	0.0000%	0.0000%	0.0005%
100899	14	5	9	7	0.0337%	0.0023%	0.0000%	0.2254%
100999	16	1	15	14	0.0487%	0.0134%	0.0000%	0.2016%
101099	16	1	15	14	0.0208%	0.0036%	0.0000%	0.1042%
101199	14	1	13	12	0.0162%	0.0014%	0.0000%	0.1127%
101299	15	3	12	11	0.0645%	0.0084%	0.0001%	0.3950%
101399	15	2	13	12	0.0152%	0.0048%	0.0002%	0.0566%
110199	16	2	14	14	0.0034%	0.0006%	0.0000%	0.0261%
110299	15	9	6	5	0.0030%	0.0000%	0.0000%	0.0110%
110599	15	2	13	9	0.0008%	0.0001%	0.0000%	0.0033%
120199	16		16	16	0.0922%	0.0176%	0.0000%	0.7453%
130899*	17		17	17	0.2914%	0.0970%	0.0000%	1.5469%
160199	16	1	15	15	0.0221%	0.0023%	0.0000%	0.1617%
160799	16	2	14	13	0.0034%	0.0013%	0.0000%	0.0260%
190199	14	3	11	8	0.0647%	0.0004%	0.0000%	0.5048%
190299	13	5	8	7	0.0599%	0.0108%	0.0030%	0.2582%
190599	13	3	10	8	0.0615%	0.0223%	0.0003%	0.3111%
190699	13	8	5	5	0.0429%	0.0073%	0.0000%	0.1912%
190899	15	2	13	13	0.3789%	0.0153%	0.0001%	4.5356%
190999	15	1	14	12	0.0073%	0.0017%	0.0000%	0.0521%
191199	13	7	6	4	0.0010%	0.0000%	0.0000%	0.0041%
200199	14	1	13	12	0.0854%	0.0098%	0.0000%	0.3625%
200399	13	1	12	11	0.0801%	0.0479%	0.0016%	0.3692%

4.9 Fractions of amounts of 99-codes per country and year as percentage of total amounts - by sub-chapter

Sub-chapter	Country (Year)									
	CZ (2004)	EE (2006)	EL (2004)	FR (2006)	HU (2004)	IE (2004)	LV (2006)	PL (2004)	PT (2004)	SI (2004)
0103	0%	100%	9%		0%	24%	0%	0%	0%	0%
0104	0%	6%	12%		0%	0%	0%	0%	20%	2%
0105	0%	0%	0%		3%	0%	0%	37%	2%	100%
0201	0%	0%	5%		0%	4%	0%	9%	14%	0%
0202	10%	5%	60%		18%	7%	39%	3%	13%	4%
0203	11%	0%	3%		2%	0%	46%	23%	23%	4%
0204	2%	0%	2%		10%	100%	31%	5%	0%	0%
0205	14%	0%	40%		23%	1%	92%	5%	32%	2%
0206	5%	100%	1%		14%	0%	59%	20%	14%	20%
0207	12%	6%	3%		32%	73%	21%	1%	18%	31%
0301	1%	4%	0%		1%	0%	2%	1%	5%	1%
0302	0%	0%	0%		0%	8%	0%	24%	93%	24%
0303	0%	0%	0%		3%	0%	0%	30%	3%	1%
0401	1%	48%	0%		3%	0%	87%	2%	5%	3%
0402	1%	1%	1%		12%	8%	25%	4%	69%	4%
0501	1%	0%	45%		0%	0%	0%	2%	0%	0%
0506	0%	0%	100%		0%	0%	0%	64%	0%	0%
0507	100%	0%	0%		15%	0%	0%	6%	0%	100%
0601	6%	0%	0%		4%	3%	58%	5%	0%	41%
0602	0%	0%	0%		0%	41%	0%	13%	30%	74%
0603	12%	0%	0%		0%	98%	24%	79%	0%	0%
0604	42%	0%	0%		0%	77%	0%	78%	8%	93%
0606	26%	0%	0%		0%	0%	0%	61%	100%	0%
0607	0%	0%	0%		0%	0%	0%	98%	100%	0%
0608	0%	0%	100%		100%	100%	0%	100%	100%	0%
0609	0%	0%	0%		0%	0%	0%	1%	0%	100%
0610	0%	0%	100%		0%	0%	0%	69%	100%	0%
0611	100%	0%	0%		0%	100%	0%	12%	0%	0%
0613	19%	0%	99%		45%	96%	0%	94%	92%	0%
0701	9%	1%	91%		81%	99%	29%	5%	26%	9%
0702	30%	56%	9%		7%	7%	98%	17%	53%	21%
0703	0%	0%	0%		0%	1%	0%	93%	1%	0%
0704	0%	0%	3%		1%	0%	0%	3%	2%	0%
0705	1%	0%	0%		0%	5%	0%	79%	2%	2%
0706	29%	0%	0%		3%	0%	0%	58%	38%	55%
0707	0%	13%	0%		1%	38%	81%	96%	0%	11%
0801	1%	0%	17%		1%	15%	0%	2%	12%	8%
0802	2%	0%	0%		56%	0%	0%	39%	5%	52%
0803	0%	0%	0%		6%	0%	0%	65%	1%	0%
0804	2%	0%	1%		12%	25%	0%	5%	7%	17%
0901	2%	0%	0%		0%	13%	0%	37%	2%	10%
1001	0%	0%	0%		0%	0%	0%	0%	0%	0%
1002	20%	0%	5%		10%	0%	10%	15%	7%	10%

Sub-chapter	Country (Year)									
	CZ (2004)	EE (2006)	EL (2004)	FR (2006)	HU (2004)	IE (2004)	LV (2006)	PL (2004)	PT (2004)	SI (2004)
1003	0%	0%	48%		0%	0%	2%	34%	0%	0%
1004	0%	0%	27%		40%	0%	0%	2%	10%	18%
1005	0%	0%	0%		7%	0%	0%	2%	1%	0%
1006	0%	0%	0%		0%	0%	0%	0%	42%	0%
1007	0%	51%	0%		100%	0%	0%	100%	33%	0%
1008	0%	0%	3%		0%	0%	100%	32%	100%	12%
1009	12%	0%	0%		4%	26%	40%	8%	10%	1%
1010	5%	100%	100%		3%	92%	0%	12%	58%	1%
1011	1%	0%	96%		1%	0%	42%	0%	1%	0%
1012	0%	0%	8%		8%	0%	0%	20%	12%	10%
1013	1%	2%	3%		53%	18%	0%	3%	11%	7%
1080	0%	0%	0%		0%	0%	0%	50%	0%	0%
1101	0%	0%	6%		3%	5%	25%	1%	2%	0%
1102	20%	0%	0%		0%	0%	0%	0%	0%	0%
1105	7%	0%	84%		5%	0%	0%	0%	0%	0%
1201	0%	0%	5%		27%	3%	0%	10%	4%	1%
1308	1%	85%	100%	88%	39%	99%	0%	89%	53%	84%
1601	0%	0%	10%		0%	0%	1%	1%	33%	2%
1607	13%	0%	0%		3%	32%	0%	1%	2%	18%
1901	0%	0%	7%		0%	0%	0%	1%	21%	0%
1902	0%	19%	98%		47%	0%	0%	21%	0%	7%
1905	63%	100%	0%		1%	0%	0%	11%	0%	100%
1906	9%	0%	0%		0%	0%	100%	0%	0%	0%
1908	4%	0%	96%		1%	0%	0%	4%	1%	3%
1909	1%	26%	0%		8%	22%	100%	2%	3%	0%
1911	0%	0%	0%		0%	0%	0%	2%	100%	0%
2001	1%	0%	0%		2%	0%	9%		4%	3%
2003	4%	0%	1%		12%	1%	0%		3%	1%

Notes: blanks = not available, 0 %: smaller than 0.5 %

4.10 Frequency of waste-codes not used per country and year as percentage of available number of codes - by sub-chapter

	Country (Year)														
	CZ (2004)	DE (2005)	EE (2006)	EL (2004)	FI (2006)	HU (2004)	IT (2004)	LT (2005/06)	LV (2006)	NL (2006)	PL (2004)	PT (2004)	SI (2004)	**Average**	No. of codes
0101	0%	0%	50%	50%	50%	0%	0%	100%	100%	0%	0%	0%	0%	**27%**	2
0103	43%	0%	86%	29%	86%	29%	0%	71%	100%	43%	57%	43%	71%	**51%**	7
0104	0%	13%	50%	25%	75%	25%	0%	50%	63%	25%	25%	13%	25%	**30%**	8
0105	17%	17%	100%	100%	100%	0%	0%	83%	100%	0%	0%	67%	67%	**50%**	6
0201	10%	0%	0%	50%	0%	0%	0%	10%	40%	0%	0%	10%	0%	**9%**	10
0202	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	5
0203	0%	0%	67%	17%	33%	17%	0%	67%	33%	17%	17%	0%	17%	**22%**	6
0204	0%	25%	100%	25%	0%	25%	0%	25%	0%	0%	0%	25%	25%	**19%**	4
0205	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	3
0206	0%	25%	75%	0%	100%	25%	0%	75%	50%	50%	0%	25%	0%	**33%**	4
0207	0%	17%	50%	0%	33%	0%	0%	50%	33%	0%	0%	0%	17%	**15%**	6
0301	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**2%**	4
0302	33%	50%	100%	100%	17%	33%	17%	67%	50%	17%	17%	0%	33%	**41%**	6
0303	0%	0%	56%	22%	0%	0%	0%	44%	67%	11%	11%	0%	22%	**18%**	9
0401	30%	30%	80%	70%	10%	20%	0%	20%	70%	30%	0%	10%	40%	**32%**	10
0402	0%	0%	55%	36%	36%	0%	0%	36%	64%	18%	18%	9%	18%	**22%**	11
0501	35%	18%	88%	47%	53%	29%	6%	65%	65%	24%	35%	24%	65%	**43%**	17
0506	25%	25%	100%	75%	75%	75%	0%	100%	100%	50%	0%	100%	75%	**62%**	4
0507	33%	0%	100%	100%	67%	0%	0%	67%	100%	0%	33%	100%	67%	**51%**	3
0601	0%	0%	71%	29%	29%	0%	0%	14%	57%	0%	0%	14%	0%	**16%**	7
0602	0%	0%	60%	60%	20%	0%	0%	60%	80%	0%	0%	0%	0%	**22%**	5
0603	0%	0%	67%	33%	33%	0%	0%	50%	33%	0%	0%	17%	17%	**19%**	6
0604	0%	0%	50%	50%	25%	0%	0%	50%	50%	0%	0%	25%	25%	**21%**	4
0605	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**4%**	2
0606	0%	0%	100%	67%	67%	67%	0%	33%	100%	0%	0%	67%	100%	**46%**	3
0607	80%	20%	100%	80%	100%	20%	20%	100%	100%	40%	60%	80%	100%	**69%**	5
0608	50%	0%	100%	50%	50%	50%	0%	50%	100%	50%	0%	50%	100%	**50%**	2
0609	75%	75%	100%	75%	75%	50%	0%	50%	100%	25%	50%	100%	75%	**65%**	4
0610	0%	50%	50%	50%	50%	50%	0%	0%	100%	0%	0%	50%	100%	**38%**	2
0611	50%	0%	100%	100%	50%	100%	0%	100%	100%	50%	50%	100%	0%	**62%**	2
0613	0%	17%	100%	67%	67%	17%	0%	33%	100%	0%	33%	67%	83%	**45%**	6
0701	10%	0%	50%	80%	20%	10%	0%	70%	60%	0%	10%	0%	20%	**25%**	10
0702	0%	0%	80%	60%	20%	13%	0%	40%	87%	0%	0%	27%	33%	**28%**	15
0703	10%	0%	100%	60%	60%	30%	0%	70%	90%	50%	40%	50%	10%	**44%**	10
0704	64%	9%	100%	64%	64%	0%	0%	91%	91%	18%	0%	64%	27%	**45%**	11
0705	25%	0%	100%	75%	8%	0%	0%	83%	42%	8%	0%	25%	8%	**29%**	12
0706	20%	0%	100%	70%	30%	0%	0%	80%	100%	10%	0%	30%	20%	**35%**	10
0707	20%	0%	70%	90%	20%	10%	0%	70%	70%	0%	20%	60%	40%	**36%**	10
0801	0%	0%	50%	17%	8%	0%	0%	8%	50%	0%	0%	0%	0%	**10%**	12
0802	0%	0%	75%	75%	50%	25%	0%	50%	100%	25%	0%	0%	25%	**33%**	4
0803	9%	27%	82%	55%	27%	9%	0%	18%	64%	18%	9%	18%	0%	**26%**	11
0804	10%	10%	50%	80%	10%	10%	0%	20%	80%	0%	10%	20%	10%	**24%**	10
0805	0%	0%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	**15%**	1
0901	23%	8%	54%	38%	31%	0%	0%	31%	46%	8%	8%	31%	15%	**23%**	13

	Country (Year)														
	CZ (2004)	DE (2005)	EE (2006)	EL (2004)	FI (2006)	HU (2004)	IT (2004)	LT (2005/06)	LV (2006)	NL (2006)	PL (2004)	PT (2004)	SI (2004)	**Average**	No. of codes
1001	5%	0%	68%	59%	14%	27%	0%	41%	73%	14%	14%	41%	50%	**31%**	22
1002	0%	0%	91%	18%	55%	9%	0%	100%	64%	9%	9%	45%	55%	**35%**	11
1003	32%	5%	100%	59%	73%	45%	5%	91%	86%	23%	50%	82%	68%	**55%**	22
1004	30%	20%	90%	40%	80%	50%	20%	100%	100%	50%	50%	50%	50%	**56%**	10
1005	10%	30%	90%	100%	70%	60%	20%	100%	100%	40%	40%	40%	60%	**58%**	10
1006	67%	33%	100%	67%	67%	22%	22%	100%	100%	56%	44%	67%	89%	**64%**	9
1007	100%	50%	75%	100%	100%	88%	0%	100%	100%	88%	88%	63%	63%	**78%**	8
1008	53%	27%	93%	73%	93%	53%	7%	100%	93%	33%	60%	93%	67%	**65%**	15
1009	7%	29%	57%	100%	43%	36%	21%	71%	79%	36%	29%	21%	50%	**44%**	14
1010	29%	29%	86%	86%	57%	50%	14%	79%	93%	50%	29%	43%	43%	**53%**	14
1011	0%	13%	93%	80%	47%	20%	0%	60%	73%	0%	7%	27%	33%	**35%**	15
1012	9%	9%	64%	64%	64%	36%	0%	64%	82%	18%	9%	27%	18%	**36%**	11
1013	9%	9%	45%	36%	55%	36%	0%	64%	73%	36%	9%	18%	36%	**33%**	11
1014	100%	0%	100%	100%	100%	100%	0%	100%	100%	0%	100%	100%	100%	**77%**	1
1101	0%	7%	64%	43%	14%	0%	0%	50%	50%	0%	0%	7%	7%	**19%**	14
1102	50%	17%	100%	100%	33%	17%	0%	100%	100%	33%	50%	83%	83%	**59%**	6
1103	0%	0%	50%	50%	0%	0%	0%	50%	50%	0%	0%	0%	100%	**23%**	2
1105	0%	0%	80%	20%	20%	0%	0%	20%	100%	0%	0%	40%	20%	**23%**	5
1201	0%	0%	38%	24%	5%	0%	0%	19%	29%	5%	5%	5%	0%	**10%**	21
1203	0%	100%	100%	100%	0%	0%	0%	50%	100%	0%	0%	50%	0%	**38%**	2
1301	0%	0%	50%	50%	13%	0%	0%	38%	50%	13%	0%	13%	0%	**17%**	8
1302	0%	0%	20%	0%	0%	0%	0%	0%	0%	20%	0%	0%	0%	**3%**	5
1303	0%	0%	50%	50%	17%	0%	0%	50%	67%	17%	17%	17%	17%	**23%**	6
1304	33%	0%	33%	0%	0%	0%	0%	33%	33%	0%	33%	33%	67%	**20%**	3
1305	0%	0%	33%	0%	0%	0%	0%	0%	17%	0%	0%	17%	0%	**5%**	6
1307	0%	0%	0%	67%	0%	0%	0%	0%	33%	0%	0%	0%	0%	**8%**	3
1308	0%	0%	33%	33%	0%	0%	0%	33%	33%	33%	0%	33%	33%	**18%**	3
1406	0%	0%	40%	20%	0%	0%	0%	20%	20%	0%	0%	0%	0%	**8%**	5
1501	0%	0%	20%	10%	0%	0%	0%	0%	20%	0%	0%	0%	0%	**4%**	10
1502	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	2
1601	0%	10%	30%	30%	20%	0%	0%	5%	30%	0%	0%	25%	5%	**12%**	20
1602	0%	0%	50%	38%	0%	0%	0%	38%	50%	0%	0%	13%	0%	**14%**	8
1603	0%	0%	0%	0%	0%	0%	0%	0%	25%	0%	0%	0%	0%	**2%**	4
1604	0%	0%	100%	33%	33%	33%	0%	67%	100%	0%	0%	33%	33%	**33%**	3
1605	0%	0%	33%	33%	0%	0%	0%	33%	67%	0%	0%	0%	0%	**13%**	6
1606	0%	0%	17%	17%	0%	0%	0%	0%	33%	0%	0%	0%	0%	**5%**	6
1607	0%	0%	33%	0%	0%	0%	0%	0%	67%	0%	0%	0%	0%	**8%**	3
1608	43%	0%	71%	43%	29%	29%	0%	57%	100%	14%	0%	43%	43%	**36%**	7
1609	0%	25%	100%	100%	0%	0%	0%	25%	100%	0%	25%	100%	0%	**37%**	4
1610	0%	0%	25%	50%	0%	0%	0%	25%	25%	0%	0%	50%	25%	**15%**	4
1611	0%	0%	83%	33%	67%	17%	0%	67%	100%	0%	0%	17%	0%	**30%**	6
1701	0%	0%	20%	80%	20%	0%	0%	0%	20%	0%	0%	0%	0%	**11%**	5
1702	0%	0%	0%	75%	0%	0%	0%	0%	25%	0%	0%	0%	0%	**8%**	4
1703	0%	0%	67%	67%	0%	0%	0%	33%	33%	0%	0%	0%	0%	**15%**	3
1704	0%	10%	20%	60%	0%	0%	0%	10%	40%	0%	0%	20%	10%	**13%**	10
1705	0%	0%	17%	50%	50%	0%	0%	17%	67%	0%	0%	50%	17%	**21%**	6
1706	0%	0%	25%	25%	25%	0%	0%	0%	50%	0%	0%	0%	0%	**10%**	4
1708	0%	0%	50%	100%	50%	50%	0%	50%	100%	0%	50%	0%	0%	**35%**	2

	Country (Year)														
	CZ (2004)	DE (2005)	EE (2006)	EL (2004)	FI (2006)	HU (2004)	IT (2004)	LT (2005/06)	LV (2006)	NL (2006)	PL (2004)	PT (2004)	SI (2004)	Average	No. of codes
1709	0%	0%	75%	75%	0%	0%	0%	25%	75%	0%	0%	50%	25%	**25%**	4
1801	0%	0%	22%	100%	11%	0%	0%	11%	11%	11%	0%	44%	0%	**16%**	9
1802	0%	14%	43%	86%	43%	14%	0%	57%	57%	29%	0%	100%	14%	**35%**	7
1901	20%	0%	87%	80%	47%	27%	0%	67%	67%	0%	7%	27%	67%	**38%**	15
1902	40%	0%	60%	40%	40%	20%	0%	60%	80%	0%	0%	40%	40%	**32%**	10
1903	0%	0%	0%	25%	25%	0%	0%	100%	100%	25%	0%	25%	25%	**25%**	4
1904	75%	50%	100%	100%	100%	100%	0%	100%	100%	75%	25%	100%	100%	**79%**	4
1905	0%	0%	75%	100%	25%	25%	0%	50%	75%	0%	25%	100%	75%	**42%**	4
1906	40%	0%	100%	80%	80%	60%	0%	100%	80%	60%	40%	80%	60%	**60%**	5
1907	0%	0%	100%	100%	0%	0%	0%	0%	50%	0%	100%	50%	50%	**35%**	2
1908	0%	8%	38%	38%	8%	8%	0%	31%	31%	8%	8%	15%	15%	**16%**	13
1909	0%	0%	43%	57%	0%	14%	0%	14%	86%	0%	0%	14%	0%	**18%**	7
1910	33%	0%	50%	67%	17%	0%	0%	0%	67%	0%	17%	33%	50%	**26%**	6
1911	63%	13%	100%	88%	100%	50%	13%	75%	75%	50%	38%	88%	88%	**65%**	8
1912	0%	0%	0%	42%	17%	8%	0%	17%	58%	0%	0%	17%	42%	**15%**	12
1913	38%	0%	100%	100%	75%	38%	0%	88%	88%	0%	50%	88%	88%	**58%**	8
2001	0%	0%	10%	50%	0%	0%	0%	10%	23%	0%		3%	3%	**8%**	30
2002	0%	0%	0%	33%	33%	0%	0%	0%	0%	0%		33%	0%	**8%**	3
2003	0%	0%	0%	29%	14%	0%	0%	0%	29%	0%		14%	0%	**7%**	7
Total	**14%**	**8%**	**61%**	**54%**	**33%**	**17%**	**2%**	**47%**	**63%**	**14%**	**15%**	**31%**	**30%**	**30%**	**839**

4.11 LoW codes with lowest usage and smallest amounts, including descriptive parameters of share from national amount – hazardous waste

Waste code	Designation	No of countries that					Descriptive statistical parameters			
		provided information	Does not use code	Uses Code [Total]	Uses code [%]	Provided quantities	mean	Median	min	max
Codes with lowest usage										
100409	wastes from cooling-water treatment containing oil	13	13		0.00%	0				
100812	tar-containing wastes from anode manufacture	13	13		0.00%	0				
100403	calcium arsenate	13	12	1	7.69%	0				
100609	wastes from cooling-water treatment containing oil	13	12	1	7.69%	0				
100707	wastes from cooling-water treatment containing oil	13	12	1	7.69%	0				
100915	waste crack-indicating agent containing dangerous substances	14	12	2	14.29%	2	0.0024%	0.0024%	0.0000%	0.0048%
191107	wastes from flue-gas cleaning	14	12	2	14.29%	1	0.0257%	0.0257%	0.0257%	0.0257%
191104	wastes from cleaning of fuel with bases	14	12	2	14.29%	1	0.0004%	0.0004%	0.0004%	0.0004%
100819	wastes from cooling-water treatment containing oil	13	11	2	15.38%	1	0.0027%	0.0027%	0.0027%	0.0027%
100508	wastes from cooling-water treatment containing oil	13	11	2	15.38%	1	0.0000%	0.0000%	0.0000%	0.0000%
050111	wastes from cleaning of fuels with bases	14	11	3	21.43%	1	0.1679%	0.1679%	0.1679%	0.1679%
101401	waste from gas cleaning containing mercury	13	10	3	23.08%	0				
060703	barium sulphate sludge containing mercury	13	10	3	23.08%	1	0.2596%	0.2596%	0.2596%	0.2596%
060903	calcium-based reaction wastes containing or contaminated with dangerous substances	14	11	3	21.43%	2	0.0001%	0.0001%	0.0000%	0.0002%
101015	waste crack-indicating agent containing dangerous substances	14	11	3	21.43%	2	0.0100%	0.0100%	0.0002%	0.0198%
080319	disperse oil	14	11	3	21.43%	2	0.0009%	0.0009%	0.0007%	0.0012%
100329	wastes from treatment of salt slags and black drosses containing dangerous substances	14	11	3	21.43%	3	2.8593%	0.5461%	0.3049%	7.7269%
191102	acid tars	14	11	3	21.43%	1	0.0001%	0.0001%	0.0001%	0.0001%
190403	non-vitrified solid phase	13	10	3	23.08%	1	0.0209%	0.0209%	0.0209%	0.0209%

Waste code	Designation	No of countries that					Descriptive statistical parameters			
		provided information	Does not use code	Uses Code [Total]	Uses code [%]	Provided quantities	mean	Median	min	max
Codes with smallest amounts										
090111	single-use cameras containing batteries included in 16 06 01, 16 06 02 or 16 06 03	14	8	6	42.86%	3	0.00008%	0.00000%	0.00000%	0.00023%
100508	wastes from cooling-water treatment containing oil	13	11	2	15.38%	1	0.00002%	0.00002%	0.00002%	0.00002%
180110	amalgam waste from dental care	13	4	9	69.23%	7	0.00008%	0.00002%	0.00000%	0.00021%
060802	wastes containing dangerous chlorosilanes	14	9	5	35.71%	3	0.00006%	0.00005%	0.00005%	0.00006%
191102	acid tars	14	11	3	21.43%	1	0.00006%	0.00006%	0.00006%	0.00006%
130309	readily biodegradable insulating and heat transmission oils	15	9	6	40.00%	4	0.00027%	0.00007%	0.00000%	0.00094%
060903	calcium-based reaction wastes containing or contaminated with dangerous substances	14	11	3	21.43%	2	0.00011%	0.00011%	0.00000%	0.00021%
130801	desalter sludges or emulsions	14	6	8	57.14%	5	0.00027%	0.00014%	0.00001%	0.00059%
060702	activated carbon from chlorine production	14	8	6	42.86%	4	0.00021%	0.00015%	0.00007%	0.00045%
160401	waste ammunition	14	2	12	85.71%	8	0.00027%	0.00015%	0.00001%	0.00094%
160108	components containing mercury	14	5	9	64.29%	5	0.00012%	0.00016%	0.00000%	0.00021%
160901	permanganates, e.g. potassium permanganate	14	7	7	50.00%	4	0.00018%	0.00016%	0.00000%	0.00039%
160110	explosive components (e.g. air bags)	14	5	9	64.29%	5	0.00024%	0.00019%	0.00006%	0.00057%
160109	components containing PCBs	14	3	11	78.57%	6	0.00032%	0.00019%	0.00000%	0.00111%
191104	wastes from cleaning of fuel with bases	14	12	2	14.29%	1	0.00038%	0.00038%	0.00038%	0.00038%
070410	other filter cakes and spent absorbents	14	8	6	42.86%	3	0.00040%	0.00038%	0.00000%	0.00080%

4.12 LoW codes with lowest usage and smallest amounts, including descriptive parameters of share from national amount – non-hazardous waste

Waste code	Designation	No of countries that					Descriptive statistical parameters			
		provided information	Does not use code	Uses Code [Total]	Uses code [%]	Provided quantities	mean	Median	min	max
Codes with lowest usage										
100705	sludges and filter cakes from gas treatment	13	12	1	7.69%	0				
100410	wastes from cooling-water treatment other than those mentioned in 10 04 09	13	12	1	7.69%	0				
100610	wastes from cooling-water treatment other than those mentioned in 10 06 09	13	12	1	7.69%	0				
100703	solid wastes from gas treatment	13	12	1	7.69%	0				
100708	wastes from cooling-water treatment other than those mentioned in 10 07 07	13	12	1	7.69%	0				
100820	wastes from cooling-water treatment other than those mentioned in 10 08 19	13	12	1	7.69%	0				
100916	waste crack-indicating agent other than those mentioned in 10 09 15	13	12	1	7.69%	0				
101016	waste crack-indicating agent other than those mentioned in 10 10 15	13	12	1	7.69%	0				
100328	wastes from cooling-water treatment other than those mentioned in 10 03 27	13	11	2	15.38%	0				
050604	waste from cooling columns	13	11	2	15.38%	1	0.0000%	0.0000%	0.0000%	0.0000%
100326	sludges and filter cakes from gas treatment other than those mentioned in 10 03 25	13	11	2	15.38%	0				
190404	aqueous liquid wastes from vitrified waste tempering	13	11	2	15.38%	0				
100509	wastes from cooling-water treatment other than those mentioned in 10 05 08	13	11	2	15.38%	1	0.0000%	0.0000%	0.0000%	0.0000%
110206	wastes from copper hydrometallurgical processes other than those mentioned in 11 02 05	13	10	3	23.08%	2	0.0007%	0.0007%	0.0004%	0.0010%
010411	wastes from potash and rock-salt processing other than those mentioned in 01 04 07	13	10	3	23.08%	1	0.0005%	0.0005%	0.0005%	0.0005%
100330	wastes from treatment of salt slags and black drosses other than those mentioned in 10 03 29	13	10	3	23.08%	1	0.0003%	0.0003%	0.0003%	0.0003%
191304	sludges from soil remediation other than those mentioned in 19 13 03	13	10	3	23.08%	0				
190605	liquor from anaerobic treatment of animal and vegetable waste	13	10	3	23.08%	1	0.4474%	0.4474%	0.4474%	0.4474%
100813	carbon-containing wastes from anode manufacture other than those mentioned in 10 08 12	13	10	3	23.08%	1	0.0000%	0.0000%	0.0000%	0.0000%
070412	sludges from on-site effluent treatment other than those mentioned in 07 04 11	13	10	3	23.08%	2	0.0002%	0.0002%	0.0000%	0.0004%
101014	waste binders other than those mentioned in 10 10 13	14	11	3	21.43%	2	0.0001%	0.0001%	0.0000%	0.0003%
061101	calcium-based reaction wastes from titanium dioxide production	13	10	3	23.08%	1	3.3580%	3.3580%	3.3580%	3.3580%
190401	vitrified waste	13	10	3	23.08%	2	0.0001%	0.0001%	0.0001%	0.0001%
Codes with smallest amounts										
100702	dross and skimmings from primary and secondary production	13	9	4	30.77%	2	0.00000%	0.00000%	0.00000%	0.00000%

Waste code	Designation	No of countries that					Descriptive statistical parameters			
		provided information	Does not use code	Uses Code [Total]	Uses code [%]	Provided quantities	mean	Median	min	max
020602	wastes from preserving agents	13	8	5	38.46%	4	0.00000%	0.00000%	0.00000%	0.00002%
090110	single-use cameras without batteries	13	9	4	30.77%	3	0.00000%	0.00000%	0.00000%	0.00000%
090112	single-use cameras containing batteries other than those mentioned in 09 01 11	13	8	5	38.46%	2	0.00000%	0.00000%	0.00000%	0.00000%
100814	anode scrap	13	8	5	38.46%	3	0.00001%	0.00000%	0.00000%	0.00002%
110203	wastes from the production of anodes for aqueous electrolytical processes	13	7	6	46.15%	3	0.00001%	0.00000%	0.00000%	0.00001%
160505	gases in pressure containers other than those mentioned in 16 05 04	13	4	9	69.23%	7	0.00002%	0.00000%	0.00000%	0.00008%
100813	carbon-containing wastes from anode manufacture other than those mentioned in 10 08 12	13	10	3	23.08%	1	0.00000%	0.00000%	0.00000%	0.00000%
160116	tanks for liquefied gas	13	6	7	53.85%	4	0.00002%	0.00001%	0.00000%	0.00007%
060902	phosphorous slag	13	7	6	46.15%	2	0.00001%	0.00001%	0.00000%	0.00001%
100701	slags from primary and secondary production	13	9	4	30.77%	2	0.00001%	0.00001%	0.00001%	0.00001%
020302	wastes from preserving agents	13	7	6	46.15%	3	0.00002%	0.00001%	0.00000%	0.00004%
050114	wastes from cooling columns	13	9	4	30.77%	1	0.00001%	0.00001%	0.00001%	0.00001%
190502	non-composted fraction of animal and vegetable waste	13	8	5	38.46%	2	0.00001%	0.00001%	0.00001%	0.00001%
190119	sands from fluidised beds	13	9	4	30.77%	1	0.00001%	0.00001%	0.00001%	0.00001%
100324	solid wastes from gas treatment other than those mentioned in 10 03 23	13	9	4	30.77%	1	0.00001%	0.00001%	0.00001%	0.00001%
100704	other particulates and dust	13	8	5	38.46%	2	0.00002%	0.00002%	0.00000%	0.00003%
180206	chemicals other than those mentioned in 18 02 05	13	8	5	38.46%	3	0.00002%	0.00002%	0.00000%	0.00005%
100818	sludges and filter cakes from flue-gas treatment other than those mentioned in 10 08 17	13	9	4	30.77%	1	0.00002%	0.00002%	0.00002%	0.00002%
070499	wastes not otherwise specified	14	4	10	71.43%	7	0.00004%	0.00003%	0.00000%	0.00009%

4.13 LoW codes with largest amounts, including descriptive parameters of share from national amount

Waste code	Designation	No of countries that					Descriptive statistical parameters			
		provided information	Does not use code	Uses Code [Total]	Uses code [%]	Provided quantities	mean	Median	min	max
Hazardous waste codes with highest amounts										
100102	coal fly ash	14		14	100.0%	11	8.7819%	5.4090%	0.0002%	53.7964%
061101	calcium-based reaction wastes from titanium dioxide production	13	10	3	23.08%	1	3.3580%	3.3580%	3.3580%	3.3580%
010309	red mud from alumina production other than the wastes mentioned in 01 03 07	13	7	6	46.15%	3	2.4835%	2.9807%	0.0000%	4.4698%
030105	sawdust, shavings, cuttings, wood, particle board and veneer other than those mentioned in 03 01 04	14		14	100.0%	11	4.7807%	2.5650%	0.1643%	21.4867%
200301	mixed municipal waste	13		13	100.0%	10	3.4052%	2.4454%	0.1164%	12.9909%
170504	soil and stones other than those mentioned in 17 05 03	14		14	100.0%	11	3.9587%	1.5825%	0.0000%	24.3048%
170904	mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	14		14	100.0%	11	1.3063%	1.4554%	0.0069%	2.8162%
060904	calcium-based reaction wastes other than those mentioned in 06 09 03	13	8	5	38.46%	2	1.4087%	1.4087%	0.0011%	2.8164%
100101	bottom ash, slag and boiler dust (excluding boiler dust mentioned in 10 01 04)	14		14	100.00%	11	2.3229%	1.3827%	0.0677%	10.7125%
010102	wastes from mineral non-metalliferous excavation	14	2	12	85.71%	8	14.6638%	1.2582%	0.0350%	44.6763%
190805	sludges from treatment of urban waste water	14	1	13	92.86%	9	1.5764%	1.1631%	0.0003%	6.2706%
100202	unprocessed slag	13	1	12	92.31%	10	1.9290%	1.0958%	0.0044%	5.5445%
020304	materials unsuitable for consumption or processing	14	1	13	92.86%	10	2.5478%	0.0877%	0.0095%	24.2827%
010412	tailings and other wastes from washing and cleaning of minerals other than those mentioned in 01 04 07 and 01 04 11	13	3	10	76.92%	7	3.6159%	0.0493%	0.0000%	23.6094%
060999	wastes not otherwise specified	14	8	6	42.86%	5	7.6421%	0.0010%	0.0000%	38.1950%

Waste code	Designation	No of countries that					Descriptive statistical parameters			
		provided information	Does not use code	Uses Code [Total]	Uses code [%]	Provided quantities	mean	Median	min	max
Non-hazardous waste codes with highest amounts										
010304	acid-generating tailings from processing of sulphide ore	13	9	4	30.77%	2	41.9191%	41.9191%	0.4742%	83.3639%
100207	solid wastes from gas treatment containing dangerous substances	14	2	12	85.71%	9	3.7442%	2.0713%	0.1417%	16.6327%
100607	sludges and filter cakes from gas treatment	13	9	4	30.77%	2	1.4419%	1.4419%	0.0000%	2.8837%
120109	machining emulsions and solutions free of halogens	15		15	100.0%	12	1.3487%	1.0540%	0.0000%	3.5886%
100308	salt slags from secondary production	14	6	8	57.14%	4	1.6709%	0.9481%	0.0054%	4.7819%
100211	wastes from cooling-water treatment containing oil	14	7	7	50.00%	4	7.6717%	0.9465%	0.1167%	28.6770%
191305	sludges from groundwater remediation containing dangerous substances	13	8	5	38.46%	3	0.6178%	0.8278%	0.0010%	1.0245%
191003	fluff-light fraction and dust containing dangerous substances	14	6	8	57.14%	4	1.0536%	0.8231%	0.0000%	2.5680%
130507	oily water from oil/water separators	15		15	100.0%	11	1.7784%	0.7763%	0.0054%	6.3602%
160708	wastes containing oil	15		15	100.0%	12	1.9337%	0.7719%	0.0021%	8.9137%
170503	soil and stones containing dangerous substances	15		15	100.0%	12	3.4115%	0.6044%	0.0049%	17.7645%
160601	lead batteries	15		15	100.0%	12	0.9050%	0.5921%	0.0361%	3.2195%
100213	sludges and filter cakes from gas treatment containing dangerous substances	14	7	7	50.00%	5	2.7773%	0.5683%	0.0000%	11.9394%
100329	wastes from treatment of salt slags and black drosses containing dangerous substances	14	11	3	21.43%	3	2.8593%	0.5461%	0.3049%	7.7269%
130205	mineral-based non-chlorinated engine, gear and lubricating oils	15		15	100.0%	12	1.1828%	0.5172%	0.0030%	4.1212%
010305	other tailings containing dangerous substances	14	8	6	42.86%	3	28.7150%	0.3961%	0.0143%	85.7346%
170301	bituminous mixtures containing coal tar	14	3	11	78.57%	7	4.4874%	0.0763%	0.0005%	25.2385%
110302	other wastes	15	1	14	93.33%	10	3.0011%	0.0083%	0.0000%	29.8254%

5 List of Guidance Documents and Tools

Titel of document	Country	Language	Publisher	Publishing date	Target Audience	Reference
Europese afvalstoffenlijst EURAL Handleiding	Belgium	Flemish	OVAM Openbare Afvalstoffenmaatschappij voor het Vlaamse Gewest	01.05.2004		BE 2004
Jäteluokitusopas (Waste Classification Guide)	Finland	Finnish	Ministry of the Environment, Statistics Finland, The Finnish Environment Institute; Publication Series: Statistics Finland, Handbooks 37	March 2005	waste producers and holders, waste treatment plants, environmental authorities	FI 2005D
Jäteluokitusopas (Waste Classification Guide)	Finland	English	Ministry of the Environment, Statistics Finland, The Finnish Environment Institute; Publication Series: Statistics Finland, Handbooks 37	June 1999	See above	FI 1999
Helena Dahlbo: Jätteen luokittelu ongelmajätteeksi – arvioinnin perusteet ja menetelmät (Classification of waste as hazardous waste – the basis and methods for evaluation)	Finland	Finnish	The Finnish Environment Institute; Publication Series: Environment Guide 98	01.09.2002	environmental authorities (regional and municipal), waste producers, research institutes and laboratories	FI 2002
Merilehto, Tuula Rytkönen and Marianne Kaplas: Jätetietojen toimittaminen VAHTI-rekisteriin (Reporting of waste data to the VAHTI database)	Finland	Finnish	The Finnish Environment Institute; Publication Series: Environment Guide	2007	enterprises and environmental authorities	FI 2007B
Mise en oeuvre du décret n° 2002-540 du 18 avril 2002 relatif à la classification des déchets	France	French	La ministre de l'écologie et du développement durable	03.10.2002	les préfets de département; le préfet de police de PARIS	FR 2002
METHODOLOGICAL GUIDE Waste classification. Practical application to storage centers	France	English	FNADE (National Federation of Depollution and Environment Activities) and UNEDE (National Trade-union of Waste Operators)	2003	operators	FNADE 2003
Kurzbericht: Ergebnisse eines EU-weiten Ringtests zur Bestimmung der Ökotoxizität (H14) dreier Abfallsubstrate …Auswertung einer Validierungsstudie zu CEN 14735	Germany	German	Umbweltbundesamt (Dessau)	01.08.2007	EU-authorities	DE 2007D
Guidelines on the Application of the Waste Catalogue Ordinance of 10 December 2001, Federal Law Gazette I p. 3379	Germany	German and English	The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety	09.08.2005	producers or owners of waste responsible for designation and classification	DE 2005
Handbook "How to apply the European List of Waste 2001/118/EC"	Germany, Baden Württemberg	German, English	Ministerium für Umwelt und Verkehr Baden-Württemberg Reihe Abfall Heft 73	01.02.2003		DE 2003
Zuordnung von Abfällen zu	Germa	Germa	Ministerium für Umwelt	20.10.20		DE 2006

Titel of document	Country	Language	Publisher	Publishing date	Target Audience	Reference
Abfallarten aus Spiegeleinträgen. Vorläufige Vollzugshinweise auf der Grundlage des Entwurfs einer Handlungilfe des Abfalltechnikausschusses der LAGA	ny, Baden Württemberg	n	und Verkehr Baden-Württemberg Reihe Abfall Heft 69	02; Aktualisiert: Feb 2006		
Vollzugshinweise zur Zuordnung von Abfällen zu den Abfallarten eines Spiegeleintrages.	Germany, Brandenburg	German	MLUV Brandenburg	09.02.2007	Abfallbehörden im Land Brandenburg	DE 2007C
HAZARD-Check: Die Bewertung der Gefährlichkeit der Abfälle	Germany, Nordrhein-Westfalen (NRW)	German	Landesumweltamt (LUA) NRW		authorities of NRW	DE 2004
European Waste Catalogue and Hazardous Waste List Valid from 1 January 2002	Ireland	English	Environmental Protection Agency, Ireland.	2002		IE 2002
HWIT Hazardous Waste Identification Tool, developed under the project HAZTRAIN led by the Clean Technology Centre (CTC), Cork Institute of Technology.	Ireland	English	HAZTRAIN is a transnational environmental training project with partners from Austria, Denmark, Ireland, Portugal, Slovakia and Slovenia. It is co-funded by the European Commission Leonardo da Vinci Community Vocational Training Action Programme (IRL/04/B/F/PP-153225).		waste producers, waste management firms, consultants or regulators	IE 2007
Guidelines for registration and classification of waste (Draft version)	Latvia	English		2005	Operators and Regional Environmental Boards	LV 2005A
Guidelines for registration and classification of waste (Final version)	Latvia	Latvian		2006	Operators and regional Environmental Boards	LV 2006
"Farligt avfall - Handbok 2003:8".	Sweden	Swedish	SwEPA			SE 2003
Orden de 13 de octubre de 1989 por la que se determinan los metodos de caracterization de los residuos toxicos y peligrosos	Spain	Espanol	Ministerio de obras publicas y urbanismo	1989	waste management industry, producers, and regulators of hazardous waste	ES 1989
Normes per a la correcta codificatcio segons el Cataleg Europeu de Residus	Spain	Catalan	La Comunidad Autónoma de Cataluña	--	--	ES CATALUNA
EUROPESE AFVALSTOFFENLIJST (EURAL) Handreiking Eural	The Netherlands	Dutch	Ministerie van VROM	01.08.2001		NL 2001A
EUROPESE AFVALSTOFFENLIJST	The Netherl	Dutch	Ministerie van VROM	01.09.2001		NL 2001B

Titel of document	Country	Langu age	Publisher	Publishin g date	Target Audience	Reference
(EURAL) Praktijktraining	ands					
Hazardous waste Interpretation of the definition and classification of hazardous waste (Technical Guidance WM 2.1)	United Kingdo m	Englis h	Environment Agency; Scottish Environment Protection Agency (SEPA); Environment and Heritage Service	2003; last update: Oct 2006	waste management industry, producers, and regulators of hazardous waste	UK 2006
The European Waste Catalogue & Hazardous Waste List (Hyperlink Tool)	United Kingdo m	Englis h	Biffa Waste Services Ltd.		waste management industry, producers	UK 2007B

6 Details for assessment of guidance documents

6.1 Primary Assessment scheme

Reference	Dominant structuring element			Reference to other relevant codes		Depth of guidance for waste classification				Supplementary limit values set for H-Criteria?	Regulation / guidance document etc. regarding H-criteria referred to	Comments
	LoW related	Origin /Industry branches related	Other	Statistical codes	OECD or Basel codes	Cases, practical examples or calculation methods given	Specific assessment steps explained	General description given	Any additional Guidance for classification			
BE 2004	yes	yes	no	no	no							Beneath LoW and waste specific description, infos to the nature of production in many industrial sectors are given.
FI 2002						no	no	yes	yes			Assessment based on the answer from the questionnaire: "Gives general guidance and describes principles for classification of waste and evaluation of its hazardous properties."
FI 2007B	yes	yes	no	no	no	yes						Assessment based on the answer from the questionnaire: "Gives guidance on reporting obligations and includes wide rage of examples on waste types generated and how waste codes ... should be used in the data base.

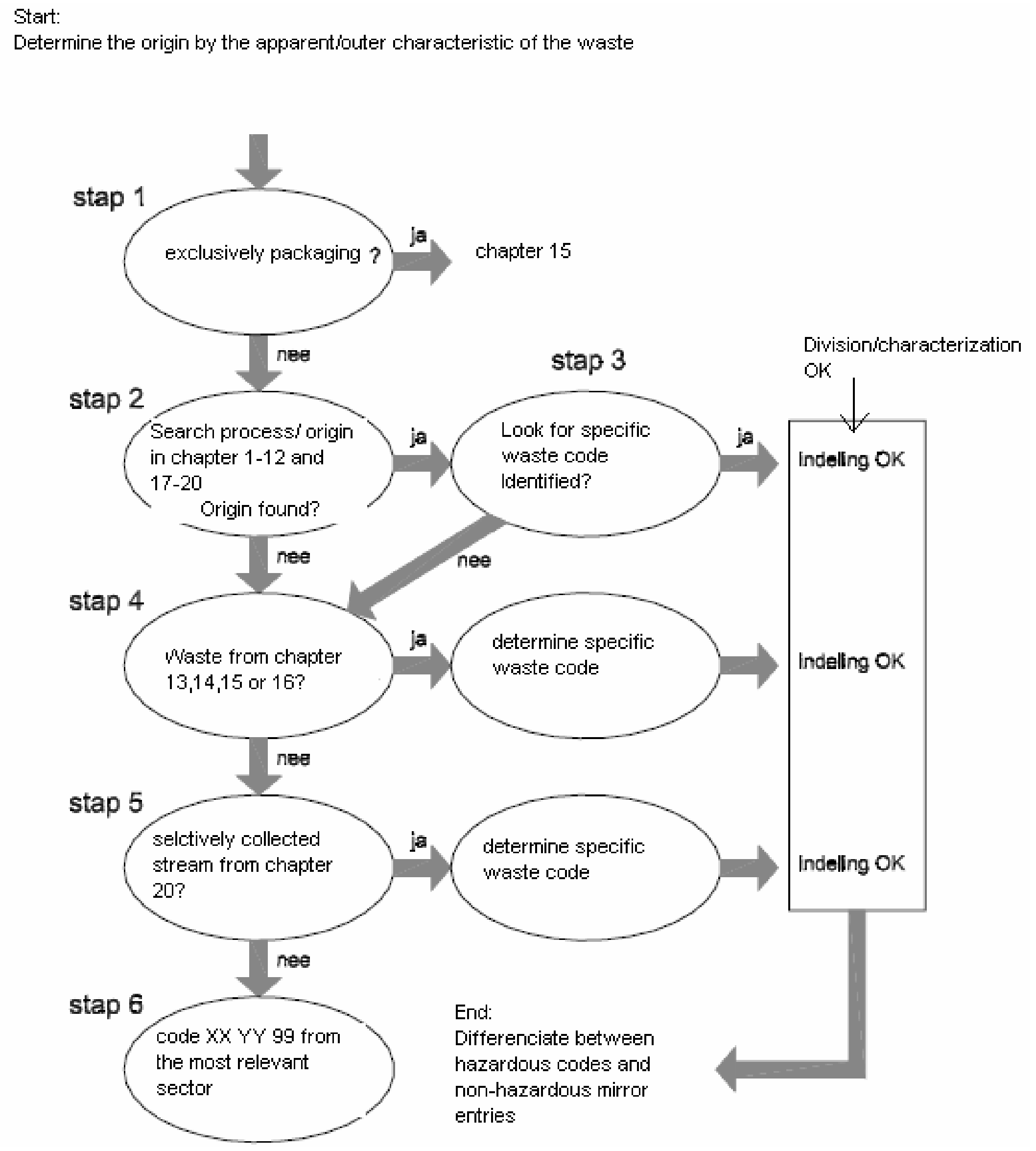
Reference	Dominant structuring element			Reference to other relevant codes		Depth of guidance for waste classification				Supplementary limit values set for H-Criteria?	Regulation / guidance document etc. regarding H-criteria referred to	Comments
	LoW related	Origin /Industry branches related	Other	Statistical codes	OECD or Basel codes	Cases, practical examples or calculation methods given	Specific assessment steps explained	General description given	Any additional Guidance for classification			
FI 2005D	yes	yes	no	no	no	no	no	yes	yes			Assessment based on the answer from the questionnaire: "Gives guidance how waste classification in the Ministry of the Environment Decree on the list of the most common wastes and hazardous wastes (1129/2001) should be applied. The instructions for classifying a specific waste are given both by economic activity and by waste type."
FI 1999	no	yes	no	yes	no	no	N0	yes	yes			Published before LoW became effective, therefore no further assessment
FNADE 2002	no	no	yes	no	no		yes			no	Examples for tests on H14 in Appendix 3 to 5	The guide helps to direct waste to a suitable storage centre. The purpose is not waste classification by itself.
DE 2007D	no	no	yes	no	no	yes	no	no	no	no	Regarding H14; Ergebnis der Studie: Norm CEN 14735 ist zur Erfassung der Ökotoxizität von Abfällen unter Praxisbedingungen geeignet	
DE2005	yes	no	no	no	no	no	yes	yes	yes	yes	H1, H2, H9, H12, H13, H14 (see chapter 3.3 and 4.2.)	

Reference	Dominant structuring element			Reference to other relevant codes		Depth of guidance for waste classification				Supplementary limit values set for H-Criteria?	Regulation / guidance document etc. regarding H-criteria referred to	Comments
	LoW related	Origin /Industry branches related	Other	Statistical codes	OECD or Basel codes	Cases, practical examples or calculation methods given	Specific assessment steps explained	General description given	Any additional Guidance for classification			
DE 2003	yes	yes	no	no	no	yes	yes	yes	yes	no		The hanbook describes selected wastes from industrial processes and their material flow and assigns the repective waste codes.
DE 2006	yes	no	no	no	no	yes	yes	yes	yes	no		Guidance for mirror-entries
DE 2007C	yes	no	no	no	no	yes	yes	yes	yes	yes	Schwellenwerte für abfalltypische Summenparameter in Originalsubstanz und Eluat / H13 (Anlage IV). Analyseverfahren s. Anlage V.	guidance for mirror-entries
DE2004	yes	no	no	no	no	no	no	yes	yes	yes	Berechnung von Stoffkonzentrationen und Zuordnung zu H1-H14 (Tab. 2)	computer applicated tool for mirror entries (based on calculation of concentration limits)
IE 2002	yes	no	no	no	no	no	no	yes	no	no		The Environmental Protection Agency funded a project under the Environmental RTDI Programme entitled Procedure for Identification of the Hazardous Components of Waste. The tool is available at www.epa.ie/techinfo.
IE 2007	yes	no	no	no	no	no	yes	yes	yes	no	The tool (in the background) compares concentration values to the concentration limits laid down in the legislation.	The tool offers a list of possible property tests that are required by legislation. Based upon the results, the HWIT will present a report

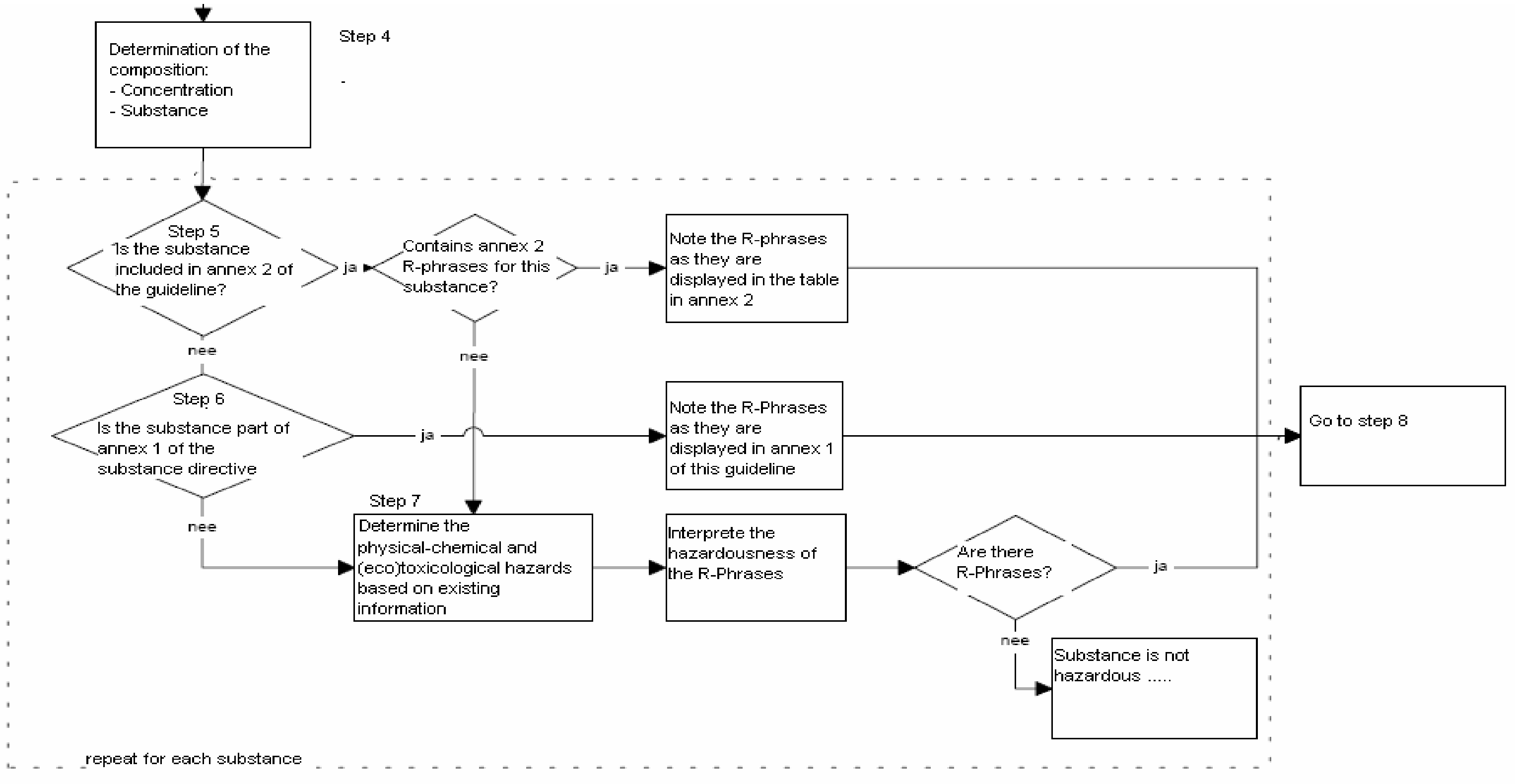
Reference	Dominant structuring element			Reference to other relevant codes		Depth of guidance for waste classification				Supplementary limit values set for H-Criteria?	Regulation / guidance document etc. regarding H-criteria referred to	Comments
	LoW related	Origin /Industry branches related	Other	Statistical codes	OECD or Basel codes	Cases, practical examples or calculation methods given	Specific assessment steps explained	General description given	Any additional Guidance for classification			
LV 2005A	yes	no	no	no	no	no	yes	yes	yes	no		Hazardous Waste Testing Protocols/Methodologies and Data Sources for H1 to H14 are under work in this draft (examples) and logical schemes for determination of hazardous properties of wastes are given."
ES 1989	No	No	No	No	No	No	No	Yes	Yes	No		
ES Cataluna	Yes	No	No	No	No	No	Yes	No	No	No	No	
SE 2003												No further assessment due to the comment from the questionaire: "The Handbook is dealing with the general provisions for the implementation of Directive 2000/532/EC, but is insufficient with regard to classifying waste."
NL2001A	yes	no	no	no	no	yes	yes	yes	yes	no	detailed list of R-phrases in relation to H-criteria; synopsis of underlaying publications	
NL 2001B												No further assessment as the guideline seems to be a training tool connected to document NL2.
UK 2006	yes	no	no	no	no	yes	yes	yes	yes	Appendix C of WM 2.1 sets out threshold concentrations for H1, H2, H3, H12, H13, H14 based on CHIP3 (national	Appendix C9 of WM 2.1	WM 2.1 is the key reference in UK (s. questionnaire 13)

Reference	Dominant structuring element			Reference to other relevant codes		Depth of guidance for waste classification				Supplementary limit values set for H-Criteria?	Regulation / guidance document etc. regarding H-criteria referred to	Comments
	LoW related	Origin /Industry branches related	Other	Statistical codes	OECD or Basel codes	Cases, practical examples or calculation methods given	Specific assessment steps explained	General description given	Any additional Guidance for classification			
										Chemical Regulations) and Directive 88/379/EEC		
UK 2007B	yes	no	no	no	no	no	no	yes	yes	no	No	Hyperlink Tool only to assist with selecting the correct EWC code

6.2 Translated Flow Scheme according to Europese afvalstoffenlijst EURAL Handleiding [BE 2004]



6.3 Translated Part of the Flow Scheme according to EUROPESE AFVALSTOFFENLIJST (EURAL) Handreiking Eural [NL 2001A]



6.4 Excerpt from Spanish Ministry Order of 13th October 1989 on the determination of characterization methods for toxic and hazardous waste

Definition of hazardous waste:

- Inflammable below 55°C determined according to the Directive 84/449/CEE A.9 “flash point”
- Corrosive characteristics:
  - pH 2 $\geq$ 12.5 or pH $\leq$ 2
  - Liquid waste, which corrodes more than 6.35 mm thick layer of iron at a temperature of 55°C.
  - Cause an injury of human tissue at en exposure of less than 5 minutes by inhalation, or contact with skin or eyes.
- Reactive characteristics, such as:
  - Instable and rapid changes with explosion,
  - Forms potentially explosive mixtures with water,
  - Releases easily inflammable or toxic gases in contact with water or humid air,
  - Contain substances like cyanide, sulphur, or others, which in media with pH 2-12.5 could generate toxic gases,
  - Could explode or react explosive when in contact with a source of energy …
  - Could explode or react explosive under normal pressure or temperature.
- Contains a carcinogenic product or probably carcinogenic in a concentration $\geq$ 0.01% in accordance with IARC (International Agency on Cancer)
- All carcinogenic, mutagenic, or teratogenic substances defined by the Real Decreto 2216/1985 in accordance with the R-phrases R45, R46, R47. Also Real Decreto 725/1988 and Orden de 7.9.1988 has to be taken into account here.
- Show a toxicity of LD50 at a concentration of $\leq$ 200 mg/kg as oral dose or LD50 at a concentration of $\leq$ 400 mg/kg in contact with skin or 2mg per ¼ hour by inhalation.
- The leachate, which are obtained by methods described in annex III of Orden de 1989, show LC50 at a concentration of $\leq$ 750 mg/l (Daphnia Magna) or $\leq$ CE50 3000 mg/l (photobacteria phosporeum) in accordance with the bio tests described in annex IV of Orden de 1989.

Recognized bio test are:

- Luminescence test with photobacteria phosporeum
- Inhibition test with Daphnia magna in accordance with 84/449/EEC

6.5 Excerpt from the EUROPEAN WASTE CATALOGUE AND HAZARDOUS WASTE LIST (IRELAND) and from Excerpt from WASTE MANAGEMENT ACT, 1996

The full text of the definition of hazardous waste can be read in the Waste Management Acts 1996 and 2001. It is also reproduced in full in the National Hazardous Waste Management Plan (available from EPA Publications, Richview, Clonskeagh Road, Dublin 14, tel: 01-2680100, fax: 01-2680199).

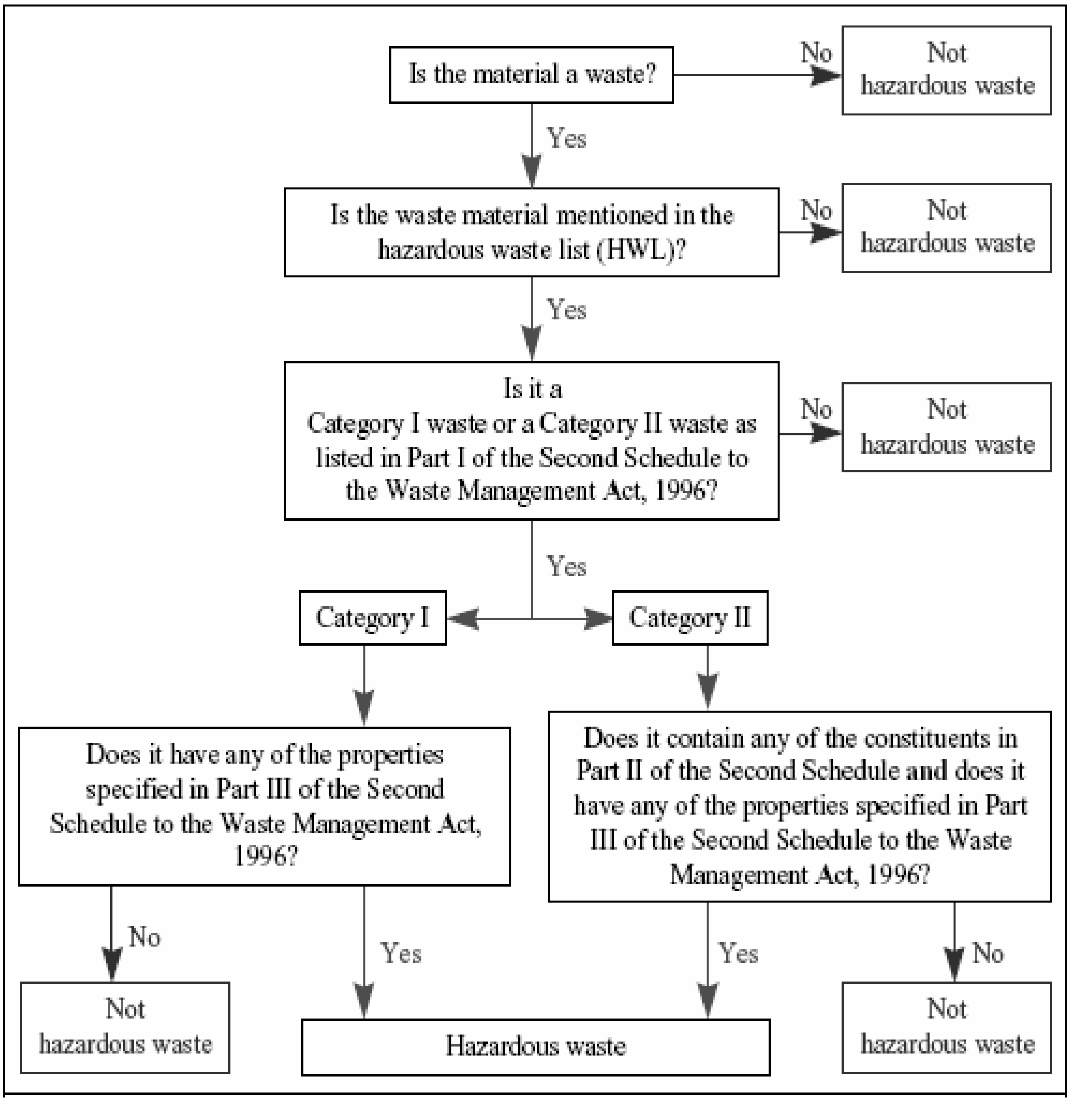


Figure 1 Hazardous waste flowchart

Excerpt from No. 10/1996:

WASTE MANAGEMENT ACT, 1996

20*th May*, 1996

4. —(1) (*a*) In this Act, "waste" means any substance or object belonging to a category of waste specified in the *First Schedule* or for the time being included in the European Waste Catalogue which the holder discards or intends or is required to discard, and anything which is discarded or otherwise dealt with as if it were waste shall be presumed to be waste until the contrary is proved.

(*b*) A reference in this Act to waste shall be construed as including a reference to hazardous waste unless the contrary intention appears.

(2) (*a*) In this Act, "hazardous waste" means—

(i) hazardous waste for the time being mentioned in the list prepared pursuant to Article 1 (4) of Council Directive 91/689/EEC of 12 December, 1991 [1] , being either—

(I) Category I waste that has any of the properties specified in *Part III* of the *Second Schedule*, or

(II) Category II waste that—

(A) contains any of the constituents specified in *Part II* of the *Second Schedule*, and

(B) has any of the properties specified in *Part III* of the said *Schedule*,

(ii) such other waste, having any of the properties specified in *Part III* of the *Second Schedule*, as may be prescribed for the purposes of this definition.

(*b*) For the purposes of the definition in this subsection—

"Category I waste" means waste specified in any of the following paragraphs of *Part I* of the *Second Schedule*, namely *paragraphs 1* to *18*;

"Category II waste" means waste specified in any of the following paragraphs of the said *Part I*, namely *paragraphs 19* to *40.*

FIRST SCHEDULE

CATEGORIES OF WASTE

1. Production or consumption residues not otherwise specified in this Schedule.
2. Products which have not been manufactured in accordance with the specifications relating to them.
3. Products whose date for appropriate use has expired.
4. Materials spilled, lost or which have undergone any other mishap (including any materials contaminated as a result of any such mishap).
5. Materials contaminated or soiled as a result of planned actions.
6. Unusable parts.
7. Substances which no longer perform satisfactorily.
8. Residues of industrial processes.
9. Residues from pollution abatement processes.
10. Machining or finishing residues.
11. Residues from the extraction and processing of raw materials.
12. Adulterated materials.
13. Any materials, substances or products whose use is prohibited by or under any enactment.
14. Products for which the holder has no further use.
15. Contaminated materials, substances or products resulting from any remedial action taken with respect to land.
16. Any materials, substances or products which are not otherwise specified in this Schedule.

SECOND SCHEDULE
HAZARDOUS WASTE
PART I
Categories or Generic Types of Hazardous Waste
Category I Waste
1. Anatomical substances, hospital or other clinical waste.
2. Pharmaceutical, medicinal or veterinary compounds.
3. Wood preservatives.
4. Biocides or phyto-pharmaceutical substances.
5. Residue from substances employed as solvents.
6. Halogenated organic substances not employed as solvents, excluding inert polymerized materials.
7. Tempering salts containing cyanides.
8. Mineral oils or oily substances (including cutting sludges).
9. Mixtures or emulsions of oil and water or hydrocarbon and water.
10. Substances containing polychlorinated biphenyls or polychlorinated terphenyls (including dielectrics).
11. Tarry materials arising from refining, distillation or any pyrolytic treatment (including still bottoms).
12. inks, dyes, pigments, paints, lacquers or varnishes.
13. Resins, latex, plasticizers, glues or adhesives.
14. Chemical substances arising from research and development or teaching activities (including laboratory residues) which are not identified or are new and whose effects on humans or the environment are not known.
15. Pyrotechnics or other explosive materials.
16. Photographic chemicals or processing materials.
17. Any material contaminated with any congener of polychlorinated dibenzo-furan.
18. Any material contaminated with any congener of polychlorinated dibenzo-p-dioxin.

Category II Waste
19. Animal or vegetable soaps, fats or waxes.
20. Non-halogenated organic substances not employed as solvents.
21. Inorganic substances without metals or metal compounds.
22. Ashes or cinders.
23. Soil, sand or clay (including dredging spoils).
24. Non-cyanidic tempering salts.
25. Metallic dust or powder.
26. Spent catalyst materials.
27. Liquids or sludges containing metals or metal compounds.
28. Residue (other than the substances mentioned in *paragraphs 29, 30* and *33*) from pollution control operations (including baghouse dusts).
29. Scrubber sludges.
30. Sludges from water purification plants.
31. Decarbonization residue.
32. Ion-exchange column residue.
33. Sewage sludges, untreated or unsuitable for use in agriculture.
34. Residue from cleaning of tanks or equipment.
35. Contaminated equipment.
36. Contaminated containers (including packaging and gas cylinders).
37. Batteries or other electrical cells.
38. Vegetable oils.

39. Materials resulting from the selective collection of waste from households.
40. Any other waste.

PART II

Constituents of Category II Waste which render it hazardous when it has the properties specified in Part III

41. Beryllium or beryllium compounds.
42. Vanadium compounds.
43. Chromium (VI) compounds.
44. Cobalt compounds.
45. Nickel compounds.
46. Copper compounds.
47. Zinc compounds.
48. Arsenic or arsenic compounds.
49. Selenium or selenium compounds.
50. Silver compounds.
51. Cadmium or cadmium compounds.
52. Tin compounds.
53. Antimony or antimony compounds.
54. Tellurium or tellurium compounds.
55. Barium compounds, excluding barium sulphate.
56. Mercury or mercury compounds.
57. Thallium or thallium compounds.
58. Lead or lead compounds.
59. Inorganic sulphides.
60. Inorganic fluorine compounds, excluding calcium fluoride.
61. Inorganic cyanides.
62. Any of the following alkaline or alkaline earth metals, namely, lithium, sodium, potassium, calcium, magnesium in uncombined form.
63. Acidic solutions or acids in solid form.
64. Basic solutions or bases in solid form.
65. Asbestos (dust or fibres).
66. Phosphorus: phosphorus compounds, excluding mineral phosphates.
67. Metal carbonyls.
68. Peroxides.
69. Chlorates.
70. Perchlorates.
71. Azides.
72. Polychlorinated biphenyls or polychlorinated terphenyls.
73. Pharmaceutical or veterinary compounds.
74. Biocides or phyto-pharmaceutical substances (including pesticides).
75. Infectious substances.
76. Creosotes.
77. Isocyanates or thiocyanates.
78. Organic cyanides (including nitriles).
79. Phenols or phenol compounds.
80. Halogenated solvents.
81. Organic solvents, excluding halogenated solvents.

82. Organohalogen compounds, excluding inert polymerized materials and other substances referred to in this Part.
83. Aromatic compounds; polycyclic and heterocyclic organic compounds.
84. Aliphatic amines.
85. Aromatic amines.
86. Ethers.
87. Substances of an explosive character, excluding those referred to elsewhere in this Part.
88. Sulphur organic compounds.
89. Any congener of polychlorinated dibenzo-furan.
90. Any congener of polychlorinated dibenzo-p-dioxin.
91. Hydrocarbons and their oxygen, nitrogen or sulphur compounds not otherwise referred to in this Part.

PART III

Properties of Waste which render it hazardous

There is set out in each paragraph of this Part a general term denoting a particular property of waste which renders it hazardous, followed by an explanation of such general term by reference to a description of substances or preparations which possess the particular property.

92. "Explosive": substances or preparations which may explode under the effect of flame or which are more sensitive to shocks or friction than dinitrobenzene.
93. "Oxidizing": substances or preparations which exhibit highly exothermic reactions when in contact with other substances, particularly flammable substances.
94. "Highly flammable":
(*a*) liquid substances or preparations having a flash point below 21°C (including extremely flammable liquids), or
(*b*) substances or preparations which may become hot and finally catch fire in contact with air at ambient temperature without any application of energy, or
(*c*) solid substances or preparations which may readily catch fire after brief contact with a source of ignition and which continue to burn or to be consumed after removal of the source of ignition, or
(*d*) gaseous substances or preparations which are flammable in air at normal pressure, or
(*e*) substances or preparations which, in contact with water or damp air, evolve highly flammable gases in dangerous quantities.
95. "Flammable": liquid substances or preparations having a flash point of not less than 21°C and not more than 55°C.
96. "Irritant": non-corrosive substances or preparations which, through immediate, prolonged or repeated contact with the skin or mucous membrane, can cause inflammation.
97. "Harmful". substances or preparations which, if they are inhaled or ingested or if they penetrate the skin, may involve limited health risks.
98. "Toxic": substances or preparations (including very toxic substances or preparations) which, if they are inhaled or ingested or if they penetrate the skin, may cause serious, acute or chronic health risks or death.
99. "Carcinogenic": substances or preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce cancer or increase its incidence.
100. "Corrosive": substances or preparations which may destroy living tissue on contact.
101. "Infectious": substances containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in humans or other living organisms.
102. "Teratogenic": substances or preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce non-hereditary congenital malformations or increase their incidence.
103. "Mutagenic": substances or preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce hereditary genetic defects or increase their incidence.

104. "Ecotoxic": substances or preparations which present or may present immediate or delayed risks for one or more sectors of the environment.

105. "Residuary hazardous property":

(*a*) substances or preparations which release toxic or very toxic gases in contact with water, air or an acid, or

(*b*) substances or preparations capable by any means, after being disposed of, of yielding another substance which possesses any property referred to in this or any other paragraph of this Part.

7 Detailed information on transposition of Decision 2000/532/EC

7.1 National waste codes of Poland

Waste CODE	Designation
Chapter 1: Wastes resulting from exploration, mining, quarrying, physical and chemical treatment of minerals	
010180	Rock waste from copper, zinc and lead mining
010380*	Tailings from enrichment by flotation of non-iron metal ores that contain hazardous substances
010381	Tailings from enrichment by flotation of non-iron metal ores other than those mentioned in 010380
010480*	Tailings from enrichment by flotation of coal that contain hazardous substances
010481	Tailings from enrichment by flotation of coal other than those mentioned in 010480
010482*	Tailings from enrichment by flotation of sulfide ores that contain hazardous substances
010483	Tailings from enrichment by flotation of sulfide ores other than those mentioned in 010482
010484*	Tailings from enrichment by flotation of phosphoric ores (phosphorites, apatites) that contain hazardous substances
010485	Tailings from enrichment by flotation of phosphoric ores (phosphorites, apatites) other than those mentioned in 010484
Group 2: Wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing	
020180*	Dead animals and animals slaughtered out of necessity as well as animal tissue waste, that exhibit hazardous properties
020181	Dead animals and animal tissue waste being high risk material (HRM) and special risk material (SRM) other than those mentioned in 020180
020182	Dead animals and animals slaughtered out of necessity
020183	Wastes from aquaculture
020280*	Animal tissue waste that exhibits hazardous properties
020281	Animal tissue waste being high risk material (HRM) and special risk material (SRM)with waste from meat-and-bone meal other than those mentioned in 020280
020282	Waste from fish flour production other than those mentioned in 020280
020380	Pomace (oil cake), sludge and other waste from vegetable products preparation (except 020381)
020381	Wastes from vegetable fodder manufacture
020382	Tobacco wastes
020480	Beet pulp
020580	Whey waste
020680	Unused edible oils
020780	Pomace (oil cake), must and post fermentation sludge, slops
Group 3: Wastes from wood processing and the production of panels and furniture, pulp, paper and cardboard	
030180*	Waste from chemical processing of wood that contain hazardous substances
030181	Waste from chemical processing of wood other than those mentioned in 030180
030182	Sludges from on-site effluent treatment
030380	Bleaching sludges from hypochlorite and chlorine processes
030381	Bleaching sludges from other bleaching processes
Group 4: Wastes from the leather, fur and textile industries	
040280	Wastes from wet treatment of textile products
Group 5: Wastes from petroleum refining, natural gas purification and pyrolytic treatment of coal	
050680*	Liquid wastes that contain phenols
Group 6: Wastes from inorganic chemical processes	
060980	Phosphogypsum
060981	Phosphogypsum mixed with slags, bottom ashes and boiler dust (except boiler dust mentioned in 100104)
061180	Wastes from zirconium compounds manufacture
061181	Wastes from chromium compounds manufacture
061182	Wastes from cobalt compounds manufacture
061183	Ferric sulfate waste
Group 7: Wastes from organic chemical processes	
070180	Carbide residue no containing hazardous substances (other than those mentioned in 070108)
070280	Wastes from rubber industry and from rubber manufacture
070480*	Expired plant protection agents, toxicity class I and II (highly toxic and toxic)
070481	Expired plant protection agents other than those mentioned in 070480
070580*	Liquid wastes containing hazardous substances
070581	Liquid wastes other than those mentioned in 070580
070680	Fuller's earth from oil refining
070681	Return cosmetics and samples
Group 8: Wastes from the manufacture, formulation, supply and use (MFSU) of coatings (paints, varnishes and vitreous enamels), adhesives,	

Waste CODE	Designation
sealants and printing inks	
080380	Disperse oil other than this mentioned in 080319
Group 9: Wastes from the photographic industry	
090180*	Expired photography reagents
Group 10: Wastes from thermal processes	
100180	Combination of ash and slags from wet diversion of boiler wastes
100181	Microspheres from fly-ashes
100182	Mixtures of fly-ashes and solid wastes from calcium based flue gas desulphurization (dry and semi-dry methods of emissions desulphurization in fluidized bed)
100280	Skimmings from iron industry
100281	Copperas waste
100580	Granulated slags from shaft furnaces and slags from rotating furnaces
100680	Shaft and granulated slags
100980	Scrap cast iron products
101180	Fluorosilicate sludges
101181*	Asbestos-containing waste
101380	Wastes from cement manufacture
101381	Wastes from gypsum manufacture
101382	Scrap products
108001	Slags from ferrosilicon manufacture
108002	Dusts from ferrosilicon manufacture
108003	Slags from ferrochromium manufacture
108004	Dusts from ferrochromium manufacture
108005	Slags from ferromanganese manufacture
108006	Dusts from ferromanganese manufacture
108099	Wastes not otherwise specified
Group 13: Oil wastes and wastes of liquid fuels (except edible oils, 05 and 12)	
130880	Oiled solid wastes from ships
Group 16: Wastes not otherwise specified in the list	
160380	Food products past their "use-by" date or unfit for consumption
1680	Other wastes
168001	Magnetic and optic recording medium
1681	Waste resulting from accidents and unplanned events
168101*	Wastes exhibiting hazardous properties
168102	Wastes other than those mentioned in 168101
1682	Waste resulting from natural disasters
168201*	Wastes exhibiting hazardous properties
168202	Wastes other than those mentioned in 168210
Group 17: Construction and demolition wastes (including excavated soil from contaminated sites)	
170180	Removed plasters, wallpapers, veneers etc.
170181	Waste from streets repairs and rebuilding
170182	Wastes not otherwise specified
170380	Building (roofing) paper waste
Group 18: Wastes from human and animal health care and / or related research (except kitchen and restaurant wastes not arising from immediate health care)	
180180*	Used therapeutic baths, biologically active, with infectious capability
180181	Used therapeutic baths, biologically active, other than those mentioned in 180180
180182*	Food remains from feeding patients residing in infectious unit
Group 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	
1980	Wastes from disposal human and animal health waste not specified in other sub-groups
198001	Waste after autoclaving of waste from human and animal health
Group 20: Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions	
200180	Pesticides other than those mentioned in 200119

7.2 National waste codes of Estonia

ESTONIAN LIST OF WASTE	REMARKS
01 WASTES RESULTING FROM EXPLORATION, MINING, QUARRYING, AND PHYSICAL AND CHEMICAL TREATMENT OF MINERALS 01 04 wastes from physical and chemical processing of non-metalliferous minerals 01 04 13 wastes from stone cutting and sawing other than those mentioned in 01 04 07, incl. wastes from treatment of limestone and dolomite	Limestone and dolomite are the biggest potential sources for 01 04 13 category of waste in Estonia. It was considered from practical reasons to mention them especially in this entry.
02 WASTES FROM AGRICULTURE, HORTICULTURE, AQUACULTURE, FORESTRY, HUNTING AND FISHING, FOOD PREPARATION AND PROCESSING **02 05 wastes from the dairy products industry** 02 05 98 whey wastes	Recovery and disposal of whey wastes from cheese production is a problem to be solved in Estonia. The special entry is needed for keeping records and reporting on this waste category.
03 WASTES FROM WOOD PROCESSING AND THE PRODUCTION OF PANELS AND FURNITURE, PULP, PAPER AND CARDBOARD **03 02 wastes from wood preservation** 03 02 97* wood preservatives containing phenols 03 02 98* sludges containing wood preservatives	In Estonia wood preservatives containing phenols (based on shale oil) are often used. Entry 03 02 98 allows to consider preservatives waste in form of sludge.
05 WASTES FROM PETROLEUM REFINING, NATURAL GAS PURIFICATION AND PYROLYTIC TREATMENT OF COAL AND OIL SHALE **05 06 wastes from the pyrolytic treatment of coal and oil shale** 05 06 96* aqueous liquid waste containing phenols (phenol water) 05 06 97* oil shale semicoke 05 06 98* tarry waste from oil shale ('fuses') **05 07 wastes from purification and transportation of natural gas and gas from pyrolytic treatment of coal and oil shale**	Oil shale is in Estonia the main category of solid fuel, which is submitted to pyrolitic treatment. Semicoke, phenol water and tarry waste are the main categories of waste which are generated in the process of shale oil production using pyrolysis Wastes under heading 05 07 are generated also in purification processes of gas from oil shale processing.
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, 10 01 96 and 10 01 97) 10 01 95 wastes from fuel storage and preparation of oil shale-fired power plants 10 01 96* bottom ash, slag and boiler dust from combustion of heavy fuel oil 10 01 97* oil shale bottom ash 10 01 98* oil shale fly ash	Bottom and fly ash from oil shale power plants are the most voluminous categories of waste in Estonia. Entry 10 01 95 is analogous to 10 01 25. 10 01 96 is foreseen for registration of waste not covered with entry 10 01 04.
16 WASTES NOT OTHERWISE SPECIFIED IN THE LIST **16 02 wastes from electrical and electronic equipment and other equipment and apparatus** 16 02 97* other discarded equipment containing hazardous components 16 02 98 other discarded equipment and apparatus other than those mentioned in 16 02 97	It has been difficult to classify according to EWC equipment and apparatus not containing electronic or electrical components. These extra entries have to solve this practical problem.
17 CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES) **17 03 bituminous mixtures, coal or oil shale tar and tarred products** 17 03 01* bituminous mixtures containing coal or oil shale tar 17 03 02 bituminous mixtures other than those mentioned in 17 03 01 17 03 03* coal or oil shale tar and tarred products **17 04 metals (including their alloys)** 17 04 10* cables containing oil, coal or oil shale tar and other dangerous substances	Tars from oil shale products are equalised with coal tar (not with crude oil bitumen)

ESTONIAN LIST OF WASTE	REMARKS
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 94 used curative seamud *(sapropel)* 18 01 95* antibiotics 18 01 96* medicines with narcotic and psychotropic effect 18 01 97* medicines containing other dangerous active ingredients 18 01 98* unsorted batches of medicines **18 02 wastes from research, diagnosis, treatment or prevention of disease involving animals** 18 02 95* antibiotics 18 02 96* medicines with narcotic and psychotropic effect 18 02 97* medicines containing other dangerous active ingredients 18 02 98* unsorted batches of medicines	Used sapropel is a voluminous type of waste generated in spas and other medical establishments and sanatoriums. Unfortunately there are no direct entries in LoW allowing to classify this waste category. As the separate collection systems of unused waste medicines are under development in Estonia, it was proposed by the Ministry of Social Affairs to have a stricter control on additional categories of medicine waste and unsorted medicines. Considering them as hazardous allows to demand special hazardous waste handling licences from companies managing medicines' waste and establish by health and environment protection authorities specific requirements for collection, storage and treatment to guarantee safety.
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 12 wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified 19 12 98 Mixed non-hazardous manufacturing wastes, excluding municipal wastes (mixed manufacturing waste)	It is not possible to classify according to original LoW mixed industrial or manufacturing wastes (which are not similar to household wastes), collected in enterprises together in the same waste bins and treated (disposed) usually together with municipal waste, but belongs principally not to the category 20 03 01.
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 95* antibiotics 20 01 96* medicines with narcotic and psychotropic effect 20 01 97* medicines containing other dangerous active ingredients 20 01 98* unsorted batches of medicines **20 03 other municipal wastes** 20 03 98 sorting residues of mixed municipal waste	See explanations above (18 01 and 18 02) 20 03 98 are wastes remaining after sorting of mixed municipal waste in specialised sorting facilities or after separate collection. Idea of classifying under chapter 20 (not under chapter 19) is to demonstrate that this category of waste must be considered firmly as municipal waste (as in Estonia disposal taxes are depending on this categorisation and from 2008 disposal of untreated mixed municipal waste 20 03 01 is prohibited)

7.3 National adaptations to the LoW in Finland

National amendments to the LoW:

- All waste medicines from consumers and health care sector are classified as hazardous (18 01 09*, 18 02 08*, 20 01 32*)

- Title of 16 02 has been extended to include also other discarded equipment than WEEE

- Two new entries were introduced for other equipment: 16 02 97* (discarded other equipment containing hazardous substances) and 16 02 98 (other discarded other equipment than those mentioned in 16 02 97)

- Other wood-based boards than particle board and veneer were included into entries 03 01 04* and 03 01 05

- The title of 20 01 was amended into "Specified waste types"

National adaptation to the hazard criteria in Art. 2 of 2000/532/EY:

The following national adaptations have been made to the hazard criteria in order to harmonise them with the Finnish and the EC Chemicals legislation:

H4: The limit value for irritant substances classified as R41 is 5 %

H5: The interpretation is specified by setting a separate limit value for substances which can cause long-term health effects:

- for substances classified as Xn and R68/exposure-route 10 %
- for substances classified as Xn and R48/exposure-route 10 %

H6: The interpretation is specified by setting a separate limit value for substances which can cause long-term health effects:

- - for substances classified T+ and R39/exposure-route 0.1 %
- - for substances classified T and R39/exposure-route 1 %
- - for substances classified T and R48/exposure-route 1 %

General provision for hazard criteria H4-8, H10 and H11: If a certain substance has a lower limit value in the EC List of Dangerous Substances the lower limit value is used instead of the limit values set in the Finnish Waste Decree.

8 Detailed information on H9

8.1 German Protection against Infection Act Section7

"Act on the Prevention and Control of Infectious Diseases in Man" (Protection against Infection Act) 20.07.2000

"Gesetz zur Verhütung und Bekämpfung von Infektionskrankheiten beim Menschen"(Infektionsschutzgesetz - IfSG) 20.07.2000

Section 7: Notifiable evidence of pathogens

(1) Any direct or indirect evidence of the following pathogens shall be notified on a named-patient basis, if the evidence suggests an acute infection:

1. Adenoviruses; only direct evidence from conjunctival smears is notifiable
2. Bacillus anthracis
3. Borrelia recurrentis
4. Brucella sp.
5. Campylobacter sp., enteropathogenic
6. Chlamydia psittaci
7. Clostridium botulinum or evidence of toxins
8. Corynebacterium diphtheriae, toxin-producing
9. Coxiella burnetii
10. Cryptosporidium parvum
11. Ebola virus
12. a) Escherichia coli, enterohemorrhagic strains (EHEC)
b) Escherichia coli, other enteropathogenic strains
13. Francisella tularensis
14. SSME virus
15. Yellow fever virus
16. Giardia lamblia
17. Haemophilus influenzae; only direct evidence obtained from liquor or blood is notifiable
18. Hanta viruses
19. Hepatitis A virus
20. Hepatitis B virus
21. Hepatitis C virus; all types of evidence are notifiable unless chronic infection is known to be present
22. Hepatitis D virus
23. Hepatitis E virus
24. Influenza viruses; only direct evidence is notifiable
25. Lassa virus
26. Legionella sp.
27. Leptospira interrogans
28. Listeria monocytogenes; only direct evidence obtained from blood, liquor or from other normally sterile sites as well as from smears taken from new borns is notifiable
29. Marburg virus
30. Measles virus
31. Mycobacterium leprae
32. Mycobacterium tuberculosis/africanum, mycobacterium bovis; notifiable is the direct evidence of pathogens and subsequently the result of resistance determination; initially also evidence of acid-fast bacilli in the sputum
33. Neisseria meningitidis; also direct evidence from liquor, blood, hemorrhagic infiltrations of the skin or from other normally sterile sites is notifiable
34. Norwalk-like virus; only direct evidence from stool is notifiable
35. Polio virus
35. Rabies virus
36. Rickettsia prowazekii

38. Rotavirus
39. Salmonella paratyphi; all types of direct evidence are notifiable
40. Salmonella typhi; all types of direct evidence are notifiable
41. Salmonella, others
42. Shigella sp.
43. Trichinella spiralis
44. Vibrio cholerae 01 and 0139
45. Yersinia enterocolitica, enteropathogenic
46. Yersinia pestis
47. Other agents of hemorrhagic fevers.

Notifications pursuant to sentence 1 shall be made according to section 8 paragraph 1 nos. 2, 3, 4 and paragraph 4, section 9 paragraphs 1, 2, 3 sentence 1 or 3.

(2) Pathogens other than those stipulated in this regulation shall be notified on a named-patient basis if their spatial and temporal cluster suggests the presence of a grave danger for the public. Notifications pursuant to sentence 1 shall be made according to section 8 paragraph 1 nos. 2, 3 and paragraph 4, section 9 paragraphs 2, 3 sentence 1 or 3.

(3) Direct or indirect evidence of the following pathogens shall be notified on a nonnamed-patient basis:

1. Treponema pallidum

2. HIV

3. Echinococcus sp.

4. Plasmodium sp.

5. Rubella virus; only congenital infections are notifiable

6. Toxoplasma gondii; only congenital infections are notifiable.

Notifications pursuant to sentence 1 shall be made according to section 8 paragraph 1 nos. 2, 3 and paragraph 4, section 9 paragraphs 2, 3 sentence 1 or 3.

8.2 Verordnung über anzeigepflichtige Tierseuchen TierSeuchAnzV (German Ordinance on notifiable animal epidemics)

Verordnung über anzeigepflichtige Tierseuchen - TierSeuchAnzV

Ausfertigungsdatum: 23.05.1991

"Verordnung über anzeigepflichtige Tierseuchen in der Fassung der Bekanntmachung vom 3. November 2004 (BGBl. I S.2764), geändert durch Artikel 15 der Verordnung vom 20.Dezember 2005 (BGBl. I S. 3499)"

§ 1 Anzeigepflichtige Tierseuchen

Folgende Tierseuchen sind anzeigepflichtig:

1. Affenpocken,
1a. Afrikanische Pferdepest,
2. Afrikanische Schweinepest,
2a. Amerikanische Faulbrut,
3. Ansteckende Blutarmut der Einhufer,
3a. Ansteckende Blutarmut der Lachse,
4. Ansteckende Schweinelähmung (Teschener Krankheit),
5. Aujeszkysche Krankheit,
5a. Befall mit dem Kleinen Bienenbeutenkäfer (Aethina tumda)
5b. Befall mit der Tropilaelaps-Milbe,
6. Beschälseuche der Pferde,
7. Blauzungenkrankheit,
8. Bovine Herpesvirus Typ 1-Infektion (alle Formen),
8a. Bovine Virus Diarrhoe,
9. Brucellose der Rinder, Schweine, Schafe und Ziegen,
9a. Ebola-Virus-Infektion,
9b. Epizootische Hämorrhagie der Hirsche,
10. Enzootische Leukose der Rinder,
11. Geflügelpest,
12. (weggefallen)
13. Infektiöse Hämatopoetische Nekrose der Salmoniden,
14. Koi Herpesvirus-Infektion der Karpfen,
15. Lumpy-skin-Krankheit (Dermatitis nodularis),
16. Lungenseuche der Rinder,
17. Maul- und Klauenseuche,
18. (weggefallen)

8.3 Verordnung über meldepflichtige Tierkrankheiten (MtierkrhtV) (German Ordinance on notifiable animal diseases)

Verordnung über meldepflichtige Tierkrankheiten vom 20. Dezember 2005 (BGBl. I, S. 3517)

ANLAGE (zu § 1)

Meldepflichtige Tierkrankheiten/Erregernachweise

Spalte 2: Krankheit oder Erreger

1. Ansteckende GehirnRückenmarkentzündung der Einhufer (Bornasche Krankheit)
2. Ansteckende Metritis des Pferdes (CEM)
3. Bösartiges Katarrhaifieber des Rindes (BKF)
4. Campylobacteriose (thermophile Campylobacter)
5. Chlamydiose (Chlamydophila Spezies)1)
6. Echinokokkose
7. Ecthyma contagiosum (Parapoxinfektion)
8. Equine VirusArteritis Infektion
9. Euterpocken des Rindes (Parapoxinfektion)
10. (weggefallen)
11. GumboroKrankheit
12. Infektiöse Laryngotracheitis des Geflügels (ILT)
13. Infektiöse Pankreasnekrose der Forellen und forellenartigen Fische (IPN)
14. Leptospirose
15. Listeriose (Listeria monocytogenes)
16. Maedi
17. Mareksche Krankheit (akute Form)
18. Paratuberkulose
19. QFieber 2)
20. Rhinitis atrophicans
21. Säugerpocken (Orthopoxinfektion)
22. Salmonellose/Salmonella spp.
23. Stomatitis papulosa Rindes (Parapoxinfektion)
24. Toxoplasmose 4)
25. Transmissible Virale Gastroenteritis des Schweines (TGE)
26. Tuberkulose 5)
27. Tularämie
28. Verotoxin bildende Escherichia coli
29. Visna
30. Vogelpocken (Avipoxinfektion)

1) außer Psittakose

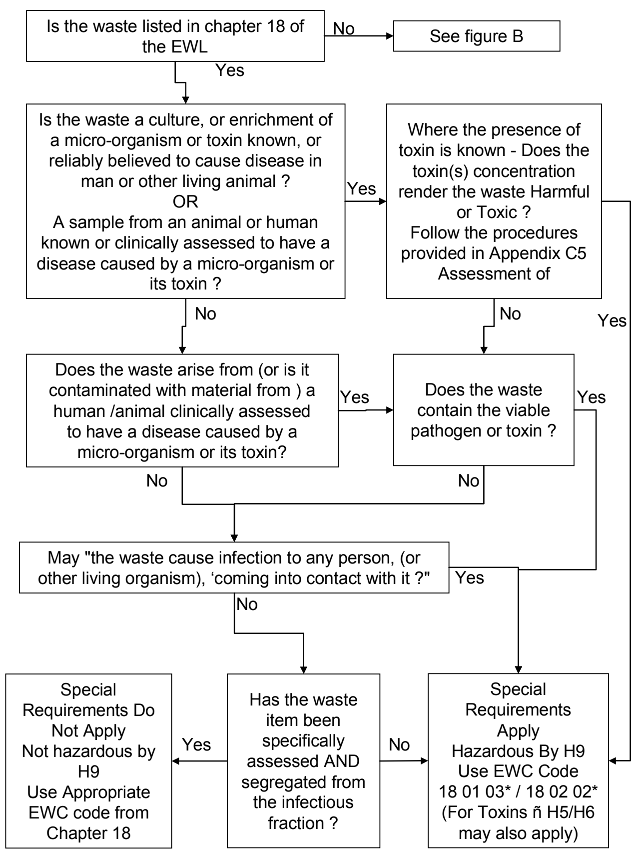
2) insbesondere andere Wiederkäuerarten

3) ausgenommen S. enteritidis und S. typhimurium beim Haushuhn, soweit die Mitteilungspflicht nach § 4 der HühnerSalmonellen Verordnung besteht, sowie Salmonellose und ihre Erreger des Rindes, soweit die Anzeigepflicht nach § 1 Nr. 28 der Verordnung über anzeigepflichtige Tierseuchen besteht

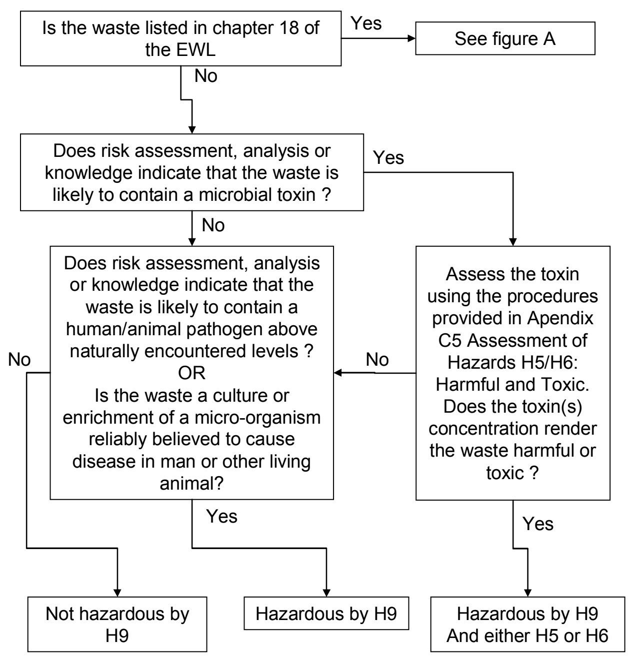
4) insbesondere alle der Lebensmittelgewinnung dienenden Säugetierarten

5) ausgenommen Mycobacterium bovis inklusive deren SubspeziesInfektionen, soweit die Anzeigepflicht nach § 1 Nr. 36 der Verordnung über anzeigepflichtige Tierseuchen besteht

8.4 Decision Tree for Healthcare Wastes according to Technical Guidance WM 2.1 Appendix C Figure A [UK 2006]



8.5 Decision Tree for potentially infectious wastes from other sources according to Technical Guidance WM 2.1 Appendix C Figure B [UK 2006]



8.6 Overview for classification of Healthcare wastes according to LAGA (2002)

Beispiel aus Anlage 1: Tabellarische Übersicht für die Zuordnung zu Abfallschlüsseln

Die nachfolgenden Tabellen sind nur im Zusammenhang mit der Richtlinie zu verwenden und können die Lektüre der Richtlinie – insbesondere Kapitel 2 – nicht ersetzen.

Hinweise zu den einzelnen Feldern:

- AVV Abfallschlüssel benennt Abfallschlüssel (AS) gemäß dem Anhang zur Abfallverzeichnis-Verordnung (sechsstelliger Schlüssel)
- AVV-Bezeichnung benennt die Art des Abfall gemäß dem Anhang zur Abfallverzeichnis-Verordnung (zum AS zugehöriger Text)
- Abfalleinstufung gibt Auskunft über die Überwachungskategorie des Abfalls.
- Abfalldefinition umschreibt die unter diesen Schlüssel fallenden Abfälle.
- EAKV 1996 nennt den alten Abfallschlüssel nach der außer Kraft getretenen "Verordnung zur Einführung des Europäischen Abfallkatalogs (EAK-Verordnung - EAKV) vom 13.09.1996. Die nach der "Verordnung zur Bestimmung von besonders überwachungsbedürftigen Abfällen – BestbüAbfV" besonders überwachungsbedürftigen Abfälle sind durch "*" gekennzeichnet.
- LAGA Gruppe Hinweis auf die frühere Einteilung in die Gruppen A - E
- Anfallstellen benennt mögliche Anfallstellen des jeweiligen Abfalls.
- Bestandteile enthält beispielhafte Auflistung der Bestandteile des jeweiligen Abfalls.
- Sammlung-Lagerung enthält Hinweise zur Sammlung und Lagerung.
- Entsorgung enthält Hinweise zur Entsorgung.
- Hinweise enthält weiterführende Hinweise.

Anlage 1 zur Richtlinie über die ordnungsgemäße Entsorgung von Abfällen aus Einrichtungen des Gesundheitsdienstes

<table>
<tr><td>AVV Abfallschlüssel
AS 18 01 01</td><td colspan="2">AVV-Bezeichnung: spitze oder scharfe Gegenstände</td><td>Abfalleinstufung:
überwachungsbedürftig bei Beseitigung</td></tr>
<tr><td colspan="3">Abfalldefinition: Spitze und scharfe Gegenstände, auch als "sharps" bezeichnet.</td><td>EAKV 1996: 18 01 01
LAGA Gruppe: B</td></tr>
<tr><td>Anfallstellen</td><td>Bestandteile</td><td>Sammlung – Lagerung</td><td>Entsorgung</td></tr>
<tr><td>Gesamter Bereich der Patientenversorgung.</td><td>Skalpelle,
Kanülen von Spritzen und Infusionssystemen,
Gegenstände mit ähnlichem Risiko für Schnitt- und Stichverletzungen.</td><td>Erfassung am Abfallort
in stich- und bruchfesten Einwegbehältnissen,
kein Umfüllen, Sortieren oder Vorbehandeln.</td><td>Keine Sortierung !!
Ggf. Entsorgung gemeinsam mit Abfällen des AS 18 01 04.</td></tr>
<tr><td colspan="4">Hinweise: Eine sichere Desinfektion der Kanülen-Hohlräume ist schwierig.
Analoge Anwendung auch auf AS 18 02 01.</td></tr>
</table>

Anlage 1 zur Richtlinie über die ordnungsgemäße Entsorgung von Abfällen aus Einrichtungen des Gesundheitsdienstes

AVV Abfallschlüssel AS 18 01 03*	AVV -Bezeichnung: andere Abfälle, an deren Sammlung und Entsorgung aus infektionspräventiver Sicht besondere Anforderungen gestellt werden.		Abfalleinstufung: besonders überwachungsbedürftiger Abfall (büA)
Abfalldefinition: Abfälle, die mit meldepflichtigen Erregern behaftet sind, wenn dadurch eine Verbreitung der Krankheit zu befürchten ist (siehe Text!)			EAKV 1996: 18 01 03* LAGA Gruppe: C
Anfallstellen	Bestandteile	Sammlung – Lagerung	Entsorgung
z. B. Operationsräume, Isoliereinheiten von Krankenhäusern, mikrobiologische Laboratorien, klinisch-chemische und infektionsserologische Laboratorien, Dialysestationen und –zentren bei Behandlung bekannter Hepatitisvirusträger, Abteilungen für Pathologie.	Abfälle, die mit erregerhaltigem Blut, Sekret oder Exkret behaftet sind oder Blut in flüssiger Form enthalten. z.B.: mit Blut oder Sekret gefüllte Gefäße, blut- oder sekretgetränkter Abfall aus Operationen,gebrauchte Dialysesysteme aus Behandlung bekannter Virusträger. Mikrobiologische Kulturen aus z.B. Instituten für Hygiene, Mikrobiologie und Virologie, Labormedizin, Arztpraxen mit entsprechender Tätigkeit.	Am Anfallort verpacken in reißfeste, feuchtigkeitsbeständige und dichte Behältnisse. Sammlung in sorgfältig verschlossenen Einwegbehältnissen (zur Verbrennung geeignet, Bauartzulassung). Kein Umfüllen oder Sortieren. Zur Vermeidung von Gasbildung begrenzte Lagerung.	Keine Verwertung !! Keine Verdichtung oder Zerkleinerung. Entsorgung als besonders überwachungsbedürftiger Abfall mit Entsorgungsnachweis: Beseitigung in zugelassener Abfallverbrennungsanlage, z.B. Sonderabfallverbrennung (SAV). oder: Desinfektion mit vom RKI zugelassenen Verfahren, dann Entsorgung wie AS 18 01 04. Achtung: Einschränkung bei bestimmten Erregern (CJK, TSE).
Hinweise: auch: spitze und scharfe Gegenstände, Körperteile und Organabfälle von Patienten mit entsprechenden Krankheiten. Analoge Anwendung auch auf AS 18 02 02*.			

8.7 Overview of answers to the questionnaire survey regarding H9

The following sections show the answers of the questionnaire survey with regard to the application of H9 by countries. For some countries there are answers available from stakeholders but no official statements from the countries. The answers of the stakeholders are marked accordingly.

Definitions for H9 "infectious"

Question 23:

- *Does there exist a definition of the hazard criteria H9 'infectious' in your country?*
  - *If yes, please give the definition*
  - *Are there specific definitions for different waste categories (e.g. health care waste, animal* testing waste,…)? If yes, please specify.

Answers:

Table 9: National definitions for Hazard Criteria H9 (answers to question 23)

Country	Definitions for H9
AT	According to the (Ordinance on Waste Classification (Abfallverzeichnisverordnung) 2003/ 570 the hazard criteria H9 is presumed to be fulfilled for: • Wastes contaminated with hazardous pathogens • Microbiological samples of risk group 2, 3 and 4 according to Directive 2000/54/EC on the protection of workers from risks related to exposure to biological agents at work • Waste contaminated with pathogens subject to reporting under veterinary legislation • Any waste regarded as infectious under community legislation.
DK	No special definition established but origin of waste is stressed as the most important criteria in the official guideline. This guideline points out especially diseases related to blood-related micro organisms (like HIV and Hepatitis B) as the main problem (especially in connection with sharp and pointed items giving raise to infection through skin) whereas other infectious diseases could be coped with by proper hygienic precautions (mostly in contact with patients and less in relation to waste). Thus only bloody and sharp/pointed clinical waste is considered 'infectious' according to the Danish guideline in handling of clinical waste.
EE	The Estonian Waste Act gives for 'infectious' the same definition as Directive 91/689/EEC. For the classification of hazardous health care wastes Estonia refers to the wording of LoW-code 18 01 03*. However, there exists no clear definition of the "special requirements in view of the prevention of infection". The Ministry of Environment has the position that this should be clarified by the Ministry of Social Affairs. If the definition of 'infectious' contains a clear aspect of probability [… which are known or reliably believed to cause disease...] then clearly the principle of precaution has to be used in practical implementation of this definition. And the methods of application must be same in every Member States.
FI	Finland has not set a binding definition or criteria for H9, apart from the general description given in Annex III of Directive 91/689/EEC. The Finnish Product Control Agency (STTV) has published in 2006 a guidance document which specifies the following wastes as infectious: • Waste from patient treatment, contaminated with microbes classified in UN 2814, category A as listed in the Annex of the Basel Convention document UNEP/CHW.7/11/Add.1/Rev.1 (table on pages 10-11) http://www.basel.int/meetings/cop/cop7/docs/11a1r1e.pdf • Waste from patient treatment and contaminated with substances classified as infectious but not fulfilling the criteria for classification to category A (UN 3373, category B) • Laboratory cultures containing microbes classified in UN 2814, category A as listed in the Annex of the Basel Convention document UNEP/CHW.7/11/Add.1/Rev.1 (table on pages 10-11) http://www.basel.int/meetings/cop/cop7/docs/11a1r1e.pdf • Laboratory waste contaminated with infectious microbes classified into UN 3373, category B • Culture dishes made for diagnostic and clinical purposes.
FR (FNADE)	Concerning the definition of H9 FNADE refers to a Decree of November 1997 without specifying neither the name of the Decree nor the definition included.
DE	DE refers to the German "Guidelines for the Application of the Waste Catalogue Ordinance" *which lays down that the criterion H9 essentially applies to chapter 18 of the LoW*. H9 is deemed to apply to the following material: • Waste contaminated with hazardous pathogens subject to registration under § 17 of the '*Protection against Infection Act'*

	(Infektionsschutzgesetz - IfSG)[3]. There, the respective diseases are listed in detail. • Waste containing pathogens (infectious substances) of the animal diseases mentioned in the '*Ordinance on notifiable animal epidemics*' (Verordnung über anzeigepflichtige Tierseuchen)[4] and in Annex 1 to the '*Ordinance on notifiable animal diseases' (Verordnung über meldepflichtige Tierkrankheiten)*[5]. Special needs for the collection and disposal of these wastes result from the known contamination or due to medical experiment from the expected contamination with pathogens of notifiable disease if a distribution of this disease is suspected. Transmission paths, such as blood, stool, saliva are also considered (DE-SA)
HU	The Hungarian *'Decree on treatment of waste which is generated in the health care institutions'* provides a list of materials to be assigned to LoW code 18 01 03* wastes whose collection and disposal is subject to special requirements in order to prevent infection'. 18 01 03* includes: (a) used sharp, pointed devices, which can cause prick or cut injury or polluted by infectious micro organism (hypodermic syringes, hypodermic syringe with needle, disposable hypodermic needle, scrap from infusion and transfusion, cut, pricking, sharp devices, ampoules, object-slide, other devices) (b) blood and blood preparation; unrecognisable human part of the body and organ's remain, discharges from operations or other medical action; and matters and remains from medical laboratory and pathological analysis (c) - all wastes from infectious or isolated departments ◦ wastes can be polluted or polluted by especially hazardous and/or resistant micro organism, which are generated by treatment of infectious illnesses (determined by other law) –EPIDEMIC ASPECT ◦ bandage, immobilization, disposable clothes, sheet, tampon, catheter, plastic bag for urine, prosthesis, incontinence sanitary pad, nappy (except the nappies of the healthy baby's , or the old person's incontinence sanitary pad) ◦ and other similar waste from medical attendance (d) Microbiological filter of air cleaner's (e) carcass, part of the body, dung and litter of experimental animals which contain infectious pathogen (f) waste of genetic engineering and microbiological (g) polluted materials and devices (bed-clothes, clothes, bandage, gloves, plastic bag for urine, infusion bottle and other devices) by citostaticum (h) primary packaging: box, container which is used for collecting infectious waste in the generation place. The inside surface of this box or container touch with infectious waste (i) secondary packaging: container, box, packing case, or other device which is used for collection or inside moving or transportation of the waste in primary packaging (j) reused vessel: empty, cleaned and disinfected usually secondary packaging
IT	Italy refers to the definitions of Directive 91/689/EEC, Annex III and the wording of the LoW waste codes 18 01 03* and 18 02 02*. As these definitions are not sufficient to identify infectious waste in practice Italy has adopted a decree that regulates the management of health care waste (Decree no. 254 of July 15, 2003). The decree defines • wastes that are generally considered to be infectious • criteria for infectiousness of biological liquids; • conditions under which health care waste may pose a risk (consideration of infection path; pathology). The following wastes are generally considered to be infectious: • all sharp and pointed devices from human and animal health care (generally considered hazardous) • wastes contaminated with pathogens from research and bacteriological diagnostics (e.g. culture media, containers, other devices) • non-identifiable organs and body parts. For waste from animal health the veterinary has broader scope of discretion than is the case for human health care waste.
NL	In the National Waste plan section Hospital Care Waste is defined which waste should be considered as 18 01 03* and 18 02 02*: • 180103*: all sharps and needles, all body fluids including blood (dried or absorbed blood excluded), all waste potentially contaminated with microorganisms originated from raising processes in laboratories, all waste which has been in direct contact with patients treated for a infectious disease listed as Cat. A (a "cultures only" category excluded) in the international transport legislation, all other waste originated form patients treated for a infectious disease which according to expert judgement can imply a risk in the waste chain. • 180202* all sharps and needles, the following waste if not regulated in Regulation 1774/2002 (Animal by products): blood or excretes (dried or absorbed blood or excretes excluded), all waste potentially contaminated with micro organism originated from cultures in laboratories, all waste which has been in direct contact with animals treated for a infectious disease listed as Cat. A (a "cultures only" category excluded) in the international transport legislation, all other waste originated from animals treated for a infectious disease which according to expert judgement can imply a risk in the waste chain.

[3] 2000, Federal Law Gazette I p. 1045, amended in 2003, Federal Law Gazette I p. 2954

[4] 2004, Federal Law Gazette I p. 2764

[5] 2001, Federal Law Gazette I p. 540, amended in 2001, Federal Law Gazette I p. 2785

RO	In addition to the definition acc. to Directive 91/689/EEC, infectious waste is defined as waste which contains or came in contact with blood or other biological fluids, as well as viruses, bacteria, parasites and/or microorganisms toxins, like: syringes, needles, needles with purl, catheters, with tubes, recipients which contained blood or other biological fluids, gloves, and other unique usage materials, compresses, and other contaminated materials, dialysis membranes, plastic bags for collecting urine, used laboratory materials etc. (Ministerial Order no. 219/2002 for the approval of the technical norms regarding the healthcare waste management and the data collecting)
SI	Waste is considered infectious: • if it contains germs hazardous to people of health, or • if it contains infectious material of animal origin.
ES	The definition in the Spanish legislation (Real Decreto 952/97) is identical to Directive Directive 91/689/EEC, Annex III and to H6.2. in Basel Annex 3: "*Substances or wastes containing viable microorganisms or their toxins which are known or suspected to cause disease in animals or humans*" Further definitions of specific categories of infectious or cytotoxic wastes are given in the legislation of some regions that have promulgated specific legislation regarding the management of infectious and cytotoxic waste (e.g. Autonomous Communities of Madrid, Valencia and Navarre).
SE	According to the knowledge of the Swedish EPA there is no common national definition: Other national authorities than Swedish EPA is guiding in interpreting its definition
UK	UK refers to the definition of Directive 91/689/EEC and to the ADR. Definition is set out in Appendix C of UKs' Technical guidance Waste Management 2.0. Any waste that is classified as infectious under the ADR (e.g. UN3291) and/or requires either incineration / disinfection / sterilisation to destroy pathogens will be classified as infectious H9.

Methods for determination

Question 24:

- *Which methods are used to determine whether a waste should be classified as hazardous on account of the criterion H9? Please describe the decision criteria and/or other approaches used, if necessary for the different categories of waste.*

Answers

Table 10: Methods and approaches used in Member States for the application of H9 (answers to question 24)

Country	Description of methods and decision criteria
AT	Please refer to question 23
DK (Dakofa)	Infectious waste is classified on the basis of origin. This approach is followed up by an official guideline.
FI	Mainly a risk based approach is applied (source separation of waste known or suspected to be contaminated with infectious substances or microbes).
FR (FNADE)	Waste is classified on the basis of origin or the knowledge of the activity that produces the waste, not by test methods. A French Standard "X30 5norme NF X 30 503: 2004 Réduction des risques microbiologiques et mécaniques par les appareils de pretraitement par disinfection des déchets d'activités de soins a risques infectieux et assimiles" is describing how to check the infectious character of the wastes
DE	The assignment of the collected waste to the waste types in chapter 18 01 and 18 02 can be derived from the LAGA Guideline on the proper disposal of waste from health care institutions (published in 2002) or the Technical guidelines on the environmentally sound management of biomedical and healthcare wastes, published by the Secretary of the Basel convention in 2003. The LAGA-Guideline provides information on all wastes arising in the institutions of the health care sector and in veterinary institutions from cradle to grave. In doubts an expert should classify a waste as hazardous or non-hazardous
HU	In Hungary there is a provision to perform biological laboratory testing of waste proving its non-hazardousness, if it was generated in sectors generally producing infectious waste (e.g. human and animal health care sector). The testing methods are standardised and there are limit values for assessment Microbiological (infectivity) studies (type of test to be selected by the authorised laboratory): ◦ Faecalis coli count ◦ Streptococcus faecalis ◦ Salmonella ◦ Oncosphere ◦ Other pathogenic bacteria where appropriate Infectious waste containing Salmonella and/or viable parasites, or F. coliform and F. streptococcus bacteria (>;200 culture/g) shall be classified as hazardous
IT	Application of H9 is based on the classification rules laid down in Decree no. 254 of July 15, 2003 on the management of health care waste. Testing is considered as inappropriate and too costly
NL	See answer to question 23
SI	SI uses microbiological methods. Currently, an amendment to the Slovenian regulation on waste treatment is being prepared which will prescribe the use of methods, described in Amendment V to Directive 67/548/EEC in the version amended by the EC Directive 84/449/EEC (OJ L 251, 19 Sept.1984, p. 1) or by any of the later EC directives adapting the Directive 67/548/EEC to the technical progress.
ES	In general, for classification only the origin is considered (human or animal healthcare waste or research). Classification is always based on prior knowledge of origin and, sometimes, on potential infectious organisms or toxins. Analytical determinations (microbiological) in waste are non-existent or very rarely done. Only, for example, in liquid waste emerging from large waste treatment autoclaves as part of their process monitoring.
UK	Assessment is based primarily on clinical assessment rather than laboratory methods. Guidance is given by: • WM2, Appendix C (http://publications.environment-agency.gov.uk/pdf/GEHO1105BJVU-e-e.pdf • Safe Management of Healthcare Waste Appendix E (http://www.dh.gov/en/Publicationsand statistics/Publications/PublicationsPolicyANDGUIDANCE/DH_063274) These guidance documents set out the segregation requirements necessary to meet the requirement of the ADR, Hazardous Waste Directive, and in a manner that divides waste that requires incineration from that which could be disinfected/sterilised and from that which could be landfilled.

Experience with applied methods

Question 25:

- *What is your experience with the definition and the methods applied? What are the advantages and shortcomings? Please give an assessment, in particular with regard to the relevance of the results and the (analytical) burden on the health care sectors and on companies.*

Answers

Table 11: Experience of Member States with the applied methods (answers to question 25)

Country	Description of advantages and problems
AT	Testing is not seen as a feasible approach
DK (Dakofa)	Classification on the basis of the origin of waste is considered as a good way of classifying.
EE	The waste code 18 01 03*[6] is applied differently by different hospitals because there is no clear definition of the “special requirements in view of the prevention of infection“. The Ministry of Environment has the position that this should be clarified by the Ministry of Social Affairs. According to Estonia, the codes is also applied differently in Member States. If the definition of ‘infectious’ contains a clear aspect of probability [… which are known or reliably believed to cause disease...] then clearly the principle of precaution has to be used in practical implementation of this definition. And the methods of application must be same in every Member States.
FR (FNADE)	Problems could appear where chemical wastes are contaminated by “prions” or legionellosis.
DE	Classification of the H9 relevant waste material is within the responsibility of the medical person, often based on a microbiological verification in compliance with the hygiene regulations (see question 23)
IT	The definition of classification rules has clearly improved and facilitated classification and the management of infectious wastes in health care institutions. Problems exist with the application in non-health-care-facilities where the acceptance of the regulations is not so high (e.g. in beauty care institutions)
LV	Latvia sees no problem with the application of H9
NL	It is a transparent method, easy to apply and to use by enforcement because it describes materials, processes and treatment of diseases. It is easy to see which waste should be regarded as infectious. The analytical burden on healthcare and enforcement therefore is relatively low. The shortcoming is of course that it is easy to understand that not all sharps, blood etc. imply a infectious risk. This means that a lot of effort was needed to get an agreement with all stakeholders on an acceptable explanation of the definition.
ES	Analytical approaches are not practical due to the difficulty to determine the hundreds of potential pathogens.

[6] 18 01 03* Waste whose collection and disposal is subject to special requirements in view of the prevention of infection”

SE	A possible disadvantage is the perceived ambiguity about the scope of H9: It is unclear whether the scope includes waste from building materials containing mold toxins, called mycotoxins. The toxins may be present in the waste although the producing organisms have died.
UK	We believe that analysis serves very little practical value as waste is often produced from the moment the patient enters the healthcare system. The waste is often transported and disposed of before the laboratory results are available. Holding this waste in order to wait for the analytical results, whilst maintaining individual patient identity, is often not practical in today's hospital environment. Relying on laboratory tests is therefore scientifically unsound, and is further compromised by the vast range of potential pathogens that would need to be screened for to provide a negative. We do not support the use of analysis as a key part of the assessment, and feel that it would be a significant and unjustifiable burden on the healthcare sector. Although we have provided procedures for H9, these are not EU wide so additional clarity might be useful.

Relevant waste types

Question 26

- *For which waste types the property H9 might be relevant according to your experience? Please name the LoW-codes.*

Answers

The following table summarises the waste sections and waste types for which the hazard criteria H9 could be relevant. The countries that mentioned the specific waste are shown in the last column. The waste types/sections named in the questionnaires are shaded in grey; the waste chapters and sections without shading were included only to facilitate the understanding of the table by providing information on the next higher classification level.

From the answers in the questionnaire it is not always clear whether the named wastes were actually classified as hazardous on account of H9, or whether the responding institution reports wastes that might in principle be relevant. The table includes all answers, as a proper distinction was not possible

Table 12: Waste types for which the hazard property H9 might be relevant

LoW code	LoW designation	Countries
02	Wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing	
02 01	Wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing	EE, ES
02 01 02	Animal-tissue waste	DE-SA
02 01 06	Animal faces, urine and manure, effluent, collected separately and treated off-site	DE-SA
02 02	Wastes from the preparation and processing of meat, fish and other foods of animal origin	EE, ES
02 02 02	Animal-tissue waste	DE-SA
02 02 03	Materials unsuitable for consumption or processing	DE-SA
17	Construction and demolition wastes (including excavated soil from contaminated sites)	
17 05	Soil (including excavated soil from contaminated sites), stones and dredging spoil	
17 05 05*	Dredging spoil containing dangerous substances (UK: canal dredgings contaminated with cyanobacterial algal toxins´; unlikely but theoretically possible.)	UK
17 09	Other construction and demolition wastes	
17 09 03*	other construction and demolition wastes containing dangerous materials (UK: horsehair plaster from historical buildings containing viable anthrax spores. there have been a number of instances where this has occurred)	UK
17 xx	Waste from building materials containing mold toxins, called mycotoxins. The toxins may be present in the waste although the producing organisms have died	SE
18	Wastes from human or animal health care and/ or related research	
18 01	Waste from natal care, diagnosis, treatment or prevention of disease in humans	DE, SI, ES
18 01 01	Sharps (except 18 01 03)	DE-SA, RO
18 01 03*	Wastes whose collection and disposal is subject to special requirements in order to prevent infection	FI, DE-SA, LV, IT, NL, RO, UK, DK, AT
18 01 04	Wastes whose collection and disposal is not subject t o special requirements in order to prevent infection (for example dressings, plaster casts, linen, disposable clothing, diapers)	DE-SA
18 02	Waste from research, diagnosis, treatment or prevention of disease involving animals	DE, SI, EE, ES
18 02 01	Sharps (except 18 02 02)	DE-SA
18 02 02*	Wastes whose collection and disposal is subject to special requirements in order to prevent infection	FI, LV, IT, NL, RO,

		UK, DK, AT
18 02 03	Wastes whose collection and disposal is not subject to special requirements in order to prevent infection	DE-SA
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	ES
19 07	landfill leachate	ES
20	Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions	
20 01	Separately collected fractions	
20 01 99	Other fractions not otherwise specified UK: Municipal clinical wastes that do not arise from healthcare and cannot, therefore, be classified in chapter 18 (Examples: substance abuse litter and sharps from body art and body piercing)	UK
	Sewage sludge	EE, ES

9 Detailed information on H12

9.1 Examples of substances which may cause a waste to exhibit hazard H12 according to Technical Guidance WM 2.1 Appendix C Table C12.2 [UK 2006]

Substance name	Risk phrases	Equation	Threshold Conc. %[1]
Phosphorus pentasulphide	R29	$P_2S_5 + 8H_2O \rightarrow 5H_2S + 2H_3PO_4$	0.1
3,5-dichloro-2,4-difluoro-benzoyl fluoride (DCDFBF)	R29	$DCDFBF + H_2O \rightarrow HF + Prod.$	1.0
Metam-sodium	R31	$CH_3NHCSSNa + H^+ \rightarrow CH_3NH_2 + CS_2 + Na^+$	0.5
Barium sulphide	R31	$BaS + 2H^+ \rightarrow H_2S + Ba^{2+}$	0.8
Barium polysulphides	R31	$BaS_n + 2H^+ \rightarrow H_2S + Ba^{2+} + S_{n-1}$	0.8
Calcium sulphide	R31	$CaS + 2H^+ \rightarrow H_2S + Ca^{2+}$	0.3
Calcium polysulphides	R31	$CaS_n + 2H^+ \rightarrow H_2S + Ca^{2+} + S_{n-1}$	0.3
Potassium sulphide	R31	$K_2S + 2H^+ \rightarrow H_2S + 2K^+$	0.5
Ammonium polysulphides	R31	$(NH_4)_2S_n + 2H^+ \rightarrow H_2S + 2NH_4^+ + S_{n-1}$	0.3
Sodium sulphide	R31	$Na_2S + 2H^+ \rightarrow H_2S + 2Na^+$	0.4
Sodium polysulphides	R31	$Na_2S_n + 2H^+ \rightarrow H_2S + 2Na^+ + S_{n-1}$	0.4
Sodium dithionite	R31	$Na_2O_6S_2 + 2H^+ \rightarrow 2Na^+ + SO_2 + H_2SO_4$	0.9
Sodium hypochlorite, solution % Cl active[2]	R31	$2NaOCl + 2H^+ \rightarrow Cl_2 + 2Na^+ + H_20$	2.9
Calcium hypochlorite % Cl active[2]	R31	$Ca(OCl)_2 + 2H^+ \rightarrow Cl_2 + Ca^{2+} + H_2O$	0.6
Dichloroisocyanuric acid	R31	$C_3HCl_2N_3O_3 + 2H^+ \rightarrow C_3H_3N_3O_3 + Cl_2$	0.9
Dichloroisocyanuric acid, sodium salt of	R31	$C_3Cl_2N_3O_3Na + 3H^+ \rightarrow C_3H_3N_3O_3 + Cl_2 + Na^+$	1.0
Sodium dichloroisocyanurate, dihydrate	R31	$C_3Cl_2N_3O_3Na + 3H^+\ 2H_2O \rightarrow C_3H_3N_3O_3 + Cl_2 + Na^+ + 2H_2O$	1.1
Trichloroisocyanuric acid	R31	$2C_3Cl_3N_3O_3 + 6H^+ \rightarrow 2C_3H_3N_3O_3 + 3Cl_2$	0.7
Hydrogen cyanide, salts of (with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide)	R32	$NaCN + H^+ \rightarrow HCN + Na^+$	0.2

9.2 Examples of toxic gases which may cause a waste to exhibit hazard H12 according to Technical Guidance WM 2.1 Appendix C Table C12.1 [UK 2006]

Substance	Chemical Formula	By Risk Phrase(s)		
		R29	R31	R32
Hydrogen sulphide	H_2S	✓	✓	✓
Hydrofluoric acid / hydrogen fluoride	HF	✓		✓
Carbon disulphide	CS_2		✓	
Sulphur dioxide	SO_2		✓	
Chlorine	Cl_2		✓	
Nitrogen dioxide	NO_2			✓
Ammonia	NH_3		✓	
Hydrogen cyanide	HCN			✓

9.3 Summary of relevant test methods for the applied risk phrases according to Technical Guidance WM 2.1 Appendix C Table C12.3 [UK 2006]

Phase	Risk Phase	Test
Liquid/solid	R29	1. Directive 92/62/EEC, Test Method A12 (a similar test is used for classification under the Transport of Dangerous Goods legislation; details and guidance on the tests can be obtained from the Health and Safety Executive
	R31	1. Modification of Directive 92/62/EEC Test Method A12 Replace water with an acid which will not cause a displacement reaction to occur. 2. Method for measuring SO_2 evolved when a waste is in contact with an acid, see text box below.
	R32	Modification of Directive 92/62/EEC Test Method A12. Replace water with an acid which will not cause a displacement reaction to occur.

9.4 Outline of method developed for measurement of SO2 evolved when a waste is in contact with an acid according to Technical Guidance WM 2.1 Appendix C12 Annex 1 [UK 2006]

• A known weight of the sample, approximately 10g, is placed in the reaction vessel.

• 250mls of 3% hydrogen peroxide in 0.1 molar sodium hydroxide are placed in an absorbing flask.

• The apparatus was connected together and nitrogen passed through the system.

• 50mls of approximately 5 molar hydrochloric acid is introduced via a dropping funnel.

• After one hour the contents of the absorbing flask is made up to 500mls.

• A portion of this is then removed, acidified, placed in an ultrasonic bath to displace oxygen, made up to a known volume and analysed by ICP/OES against a sulphate standard.

The method gives a concentration of SO2 evolved in mg/l. The result is calculated to obtain a volume of gas liberated by a litre of the waste. When looking at a reaction with acids, the toxic gas evolved could be quite small. This method has been devised specifically to determine; firstly, whether the waste releases toxic or very toxic gas (H12) and secondly, the actual concentration of sulphur dioxide evolved.

For liquid wastes the reaction is going to be rapid. Where sufficient gas is obtained in one hour to make it hazardous, the initial rate of gas production would be expected to be very high.

9.5 Calculation method for H12 according to Technical Guidance WM 2.1 Appendix C12 [UK 2006]

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

   $$aA + bB = cC + gG$$

   where: A, B, and C are the products and reactants with G being a toxic gas; and

   a, b, c and g are the stoichiometric ratios between the products and reactants.

2. Attribute molecular weights and stoichiometric ratios to the substances in the equation.
3. Divide (a x molar weight of A) by (g x 22.4 (the volume of 1 mol of gas at standard temperature and pressure (STP 25°C and 1 atmosphere pressure). This gives the mass of reactant A that will evolve 1 litre of gas G.
4. The limiting concentration for the substance in the waste with the potential to show hazard H12 is this amount (in grams) divided by 1,000 (to convert to kg) and multiplied by 100 (to give % by weight).

Example Calculation – The main constituents which may make aluminium drosses and slags hazardous are aluminium, aluminium nitride, aluminium carbide. Aluminium nitride is an R29 substance which may make the waste hazardous by H12. The aluminium nitride content may be 0-1% (slag) or 0-10% (dross). Applying this calculation method to the aluminium drosses and slags gives the following threshold limit for H12 (Note: other constituents may make the aluminium drosses and slags hazardous by H3A(v), See Appendix C3).

Aluminium nitride (R29) giving rise to hazard H12

AlN	+	$3H_2O$	→	$Al(OH)_3$	+	NH_3
aluminium nitride		water		aluminium hydroxide		ammonia
41 g		18 g		78 g		17 g
1 mol		3 mol		1 mol		1 mol

Limiting concentration of aluminium nitride in waste

$$=[(1 \times 41) / (1 \times 22.4) / 1{,}000] \times 100 = 0.18\% \approx 0.2\%$$

9.6 Overview of answers to the questionnaire survey regarding H12

The following sections show the answers of the questionnaire survey with regard to the application of H12 by countries. For some countries there are answers available from stakeholders but no official statements from the countries. The answers of the stakeholders are marked accordingly.

Application of H12 in Member States

Question 27

- Is *the criterion H12 applied in your country?*

Answers

Table 1: Answers to question 27 concerning the application of H12

Criterion is applied in:	FI, UK, SI, HU, DE, AT, FR[1], DK[2], ES
No information available whether H12 is applied in:	EE, LT, RO, SE
H12 is not applied in:	IT

1) FR: Information from Arcelormittal and FNADE

2) DK: Information from DAKOFA

Methods for determination and concentration limits applied

Question 28

- *Which methods are used to determine whether a waste should be classified as hazardous on account of the criterion H12?*
  - *Please describe the test methods and/or other approaches used.*
  - *If analytical methods are applied:*
    - *which parameters are analysed?*
    - *which concentration levels are applied*

Question 29

- *What is your experience with the applied methods? What are the advantages and shortcomings? Please give an assessment, in particular with regard to the relevance of the results and the (analytical) burden on companies.*

Answers

The answers are summarised in Table 6.

Table 14: Methods and limit values limits for H12 (answers to questions 28 and 29)

Country	Description of methods, parameters and limit values
AT	H12 applies for waste with a yield of purgeable sulphides and cyanides exceeding the following limits at pH4: S^{2-}: 10,000mg/kg TM CN^{-}: 1,000mg/kg TM *Annex 3 of the Austrian Ordinance on Waste Classification 2003/570 (Anlage 3 der österreichischen Abfallverzeichnisverordnung 2003/570)*
DE	Determination via R-phrases R29, R31 and R32 Based on the "Guidelines on the Application of the Waste Catalogue Ordinance" the following constituents necessitate the assessment regarding a potential release of gas: • aluminium nitride, aluminium phosphide, phosphorus(V) sulphide (R29), • sodium hypochlorite, chlorinated lime, alkali and alkaline earth sulphides and polysulphides, sodium dithionite (R31), • salts of hydrocyanic acid, sodium azide (R32). By analogy with the procedure for labelling with R15 (hazardous property H3-A, Annex V to the Dangerous Substances Directive, Method A-12), in the case of the above-mentioned R phrases a minimum quantity of 1 l/kg.h of toxic or very toxic gas released may be used to classify the waste as hazardous.
DK (Dakofa)	Determination via R-phrases R29, R31, R32 or R15/R29. No methods or limit values defined.
FI	H12 applies for waste that contains substances classified with the risk phrases R29, R31 or R32. In addition, instructions published by UK (WM2 Hazardous Waste, Appendix C) and by other countries are used to determine if a waste exhibits hazard characteristic H12. (The *'other countries'* are not specified in the questionnaire)
HU	Determination via R-phrases in combination with concentration limits defined in the Hungarian Act XXV of 2000 on Chemical Safety.
LV	Determination via R-phrases R 29, R 31 or R 32. No test methods used.
UK	Reference to chapter 12 of WM2 Hazardous Waste, Appendix C: • H12 applies for waste that contains substances classified with the risk phrases R29, R31, R32 or R15/29. • UK proposes to apply test method A12 test according to Annex V of Directive 67/548/EEC for R29 and modified versions of A12 for R31 and R32 in combination with the limit value of $1m^3$ toxic gas in one hour. As alternative a calculation method is proposed. Examples of substances which may cause a waste to exhibit hazard H12 and the calculated threshold concentrations are given in WM2.
SI	Determination by means of gas development methods (e.g. DIN 38 414 Teil 8), or by ECB (European Chemicals Bureau) testing methods (Annex V, Part A). Classification on the basis of the volume and composition of the gas. Assessment based on maximum exposure limits (MEL) and risk-analysis is carried out for each case individually. Waste is classified with H12 if the following limit values are exceeded. • Sulphide: 10,000 mg/kg • Cyanide: 1,000 mg/kg
ES	The national Ministerial Order 13/10/89 sets out that waste is hazardous if it presents the following "reactivity" characteristics: "It contains substances such as cyanides, sulphides or others that can, at pH between 2 and 12.5, generate toxic gases" (definition taken from USEPA, 40 CFR 261.24) Test methods include a combination of Method A 12 of Annex V of Directive 67/548/EWC (intended in principle for flammable gases) with other methods to determine hydrogen sulphide, hydrogen cyanide or other hazardous gases potentially released. "Other methods" include those described in USEPA SW846 (rev 3, 1996), Chapter 7.3, for distillation of reactive sulphide and cyanide, and in USEPA SW846 9014 and 9034 for quantitation of sulphide and cyanide in the absorbent solutions. (Note: Methods are still used in Spain although USEPA has withdrawn interim guidance). Spanish legislation does not provide concentration levels. USEPA criterion for **reactive sulphide (500 mg/kg)** and **cyanide (250 mg/kg)** are often used unofficially. In recent years a wide interpretation of the 1 L/kg/h threshold for flammable gases (Method A12 Directive 67/548/EC) has been applied to toxic gases evolved. In order to apply this criterion the mass determined is transformed to volume of the gas at standard temperature and pressure. This is also unofficial. None of the options described above is risk-based and, thereby quite useless. If no risk-based threshold, and associated "reactivity" methodology is agreed at the EU level it would be best to eliminate this criterion.

Relevant waste types

<u>Question 30:</u>

- *For which waste types the property H12 might be relevant according to your experience? Please name the LoW-codes.*

Answers

Table 19 summarises the waste sections and waste types for which the hazard criteria H12 could be relevant. The countries that mentioned the specific waste are shown in the last column. The waste types/sections named in the questionnaires are shaded in grey; the waste chapters and sections without shading were included only to facilitate the understanding of the table by providing information on the next higher classification level.

From the answers in the questionnaire it is not always clear whether the named wastes were actually classified as hazardous on account of H12, or whether the responding institution reports wastes that might in principle be relevant. The table includes all answers, as a proper distinction was not possible.

Table 15: Waste types for which the hazard property H12 might be relevant (answers to question 30)

LoW code	LoW designation	Countries
01	wastes resulting from exploration, mining, quarrying, physical and chemical treatment of minerals	
01 03	wastes from physical and chemical processing of metalliferous minerals	
01 03 04*	acid-generating tailings from processing of sulphide ore	SI,
05	wastes from petroleum refining, natural gas purification and pyrolytic treatment of coal	
05 01	wastes from petroleum refining	
05 01 03*	tank bottom sludges	AT
05 01 16	sulphur-containing wastes from petroleum desulphurisation	AT
05 07	wastes from natural gas purification and transportation	
05 07 02	wastes containing sulphur	AT
06	wastes from inorganic chemical processes	
06 01	wastes from the manufacture, formulation, supply and use (MFSU) of acids	
06 01 03*	hydrofluoric acid	SI
06 03	wastes from the MFSU of salts and their solutions and metallic oxides	DE
06 03 11*	solid salts and solutions containing cyanides	SI, LV, AT
06 06	wastes from the MFSU of sulphur chemicals, sulphur chemical processes and desulphurisation processes	DE
06 06 02*	wastes containing dangerous sulphides	SI, LV, AT
06 07 02*	activated carbon from chlorine production	LV
06 10	wastes from the MFSU of nitrogen chemicals, nitrogen chemical processes and fertiliser manufacture	DE
08	wastes from the manufacture, formulation, supply, and use (MFSU) of coatings (paints, varnishes, and vitreous enamels), adhesives, sealants and printing inks	
08 05	wastes not otherwise specified in 08	
08 05 01*	waste isocyanates	SI
10	wastes from thermal processes	
10 02	wastes from the iron and steel industry	
10 02 07*	solid wastes from gas treatment containing dangerous substances	ES
10 03	wastes from aluminium thermal metallurgy	DE
10 03 08*	Salt slags from secondary production	ES
10 03 15*	skimmings that are flammable or emit, upon contact with water, flammable gases in dangerous quantities	LV, DE-SA, ES

LoW code	LoW designation	Countries
10 03 19*	flue-gas dust containing dangerous substances	FNADE (FR), ES
10 05	wastes from zinc thermal metallurgy	
10 05 10*	dross and skimmings that are flammable or emit, upon contact with water, flammable gases in dangerous quantities	DE-SA
10 08	wastes from other non-ferrous thermal metallurgy	DE
10 08 10*	dross and skimmings that are flammable or emit, upon contact with water, flammable gases in dangerous quantities	DE-SA
11	wastes from chemical surface treatment and coating of metals and other materials; non-ferrous hydrometallurgy	
11 01	wastes from chemical surface treatment and coating of metals and other materials	
11 01 09*	sludges and filter cakes containing dangerous substances	AT
11 03	sludges and solids from tempering processes	
11 03 01*	wastes containing cyanide	SI, LV, AT
11 03 02*	other wastes	LV
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 18*	metal sludge (grinding, honing and lapping saludge) containing oil	ES
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 02	wastes from physico/chemical treatments of waste (includingdechromatation, decyanidation, neutralisation	
19 02 04	premixed wastes composed of at least one hazardous waste	SI
	lithium batteries	DAKOFA (DK), SE
	sediments, slags from thermal power plants, sludges from waste water treatment plants	ES

AT also provided national codes for which H12 might be relevant. The respective codes are shown in the following table.

Table 16: Austrian Waste Codes for which the hazard property H12 might be relevant

Austrian Code	Description
14401	sludge from liming
31221*	other slag from steel processing
39904	gas cleaning reaction mass
39907	residues containing elementary sulphur
39909*	other solid mineral wastes containing dangerous substances
51101*	cyanide containing electroplating sludge
51502*	skinning salts
51505*	liming chemicals (leather chemicals)
51528*	alkali and alkaline earth metals sulphides
51529*	heavy metal sulphides
51533*	cyanides
52722*	rinsing water, containing metal salts
52725*	aqueous concentrates
54715*	sludge from tank cleaning
54716*	iron sulphides
94801*	other water treatment sludges with hazardous constituents

10 Detailed information on H13

10.1 Limit values for different parameters for classification of H13 from different sources – Total content

Components	Country		
	Austria	Slovenia	DE [DE 2005]
Mercury	20 mg/kg DM	20 mg/kg DM[4]	
Arsenic	5,000 mg/kg DM[1]	5,000 mg/kg DM[5,6]	
Cadmium	5,000 mg/kg DM[1]	5,000 mg/kg DM[5,6]	
Lead		10,000 mg/kg DM[5,6]	
PAH	300 mg/kg DM[2]	100 mg/kg DM	
PCB (7 congeners)	30 mg/kg DM	100 mg/kg DM	
PCDD/PCDF	10,000 ng TE/kg DM	10,000 ng TE/kg DM[7]	
POX	1,000 mg/kg DM	1,000 mg/kg DM	
HC (hydrocarbon index)	20,000 mg/kg DM[3]		
Hydrocarbons		20,000 mg/kg DM[8]	8,000 mg/kg
BTEX	500 mg/kg DM	500 mg/kg DM	
Phenoles (free)	10,000 mg/kg DM	10,000 mg/kg DM	

1) The limit value does not apply to alloys

2) For tar containing B&D wastes a limit value of 50 mg/kg DM benzo[a]pyrene applies and a total content of PAH of 1,000 mg/kg DM.

3) Not applicable to bitumen/bituminous wastes

4) For solidified waste with difficulties to dissolve sulphide contents the limit values is 3000 mg/ kg DM

5) Does not apply to vitrified waste.

6) Does not apply to persistent alloys.

7) TE according to the Directive on emission to the air from incineration plants and for co-incineration.

8) Does not apply to asphalt and bitumen.

10.2 Limit values for different parameters for classification of H13 from different sources – Eluate

Source	Acceptance Criteria according to Landfill Directive (2003/33/EC) Section 2.3.1		Section 2.4.1		AT		SI	DE [DE 2005]	DE 2007C
Description of applied method	Percolation test	L/S = 10 l/kg	Percolation test	L/S = 10 l/kg	L:S = 10:1	Concentration in liquids	Concentration in liquids		
Unit	mg/l	mg/ kg DM	mg/l	mg/ kg DM	mg/ kg DM	mg/l	mg/l	mg/l	mg/l
pH					6[1]– 13	2 - 11.5	6-13[4]		5.5-13.0
Sb	0.15	0.7	1	5	5	0.5	5	0.07	
As	0.3	2	3	25	25	2.5	5	0.02	0.5
Ba	20	100	60	300	300	30	50	10	
Be					5	0.5	0.5		
B					1000	100	100		
Pb	3	10	15	50	50	5	10	1	1
Cd	0.3	1	1.7	5	5	0.5	0.5	0.1	0.1
Cr (total)	2.5	10	15	70	70	7	50	1	
Cr (VI)					20	2	2		0.1
Co					100	10	10		
Cu	30	50	60	100	100	10		5	5
Mo	3.5	10	10	30	30	3		1	
Ni	3	10	12	40	40	4	50	1	1
Hg	0.03	0.2	0.3	2	0.5	0.05	0.05	0.02	0.02
Se	0.2	0.5	3	7	7	0.07		0.05	
Ag					50	5	5		
Tl					20	2	2		
V					200	20	20		
Zn	15	50	60	200	100	20	100	5	5
Sn					1000	100	100		
CN total					200	20	20		
CN free					20	2	2		0.5
S^{-2}					200	20	20		
Sulphate	7000	20000	17000	50000					
Cl^-	8500	15000	15000	25000					
F^-	40	150	120	500	500	50	50	15	25
NH_4^-					10000	1	1		200
NO_2^-					1000	100	30		
HC Index					1000[2]	100	100[5,6]		
PAH					1.5	0.15	0.05[6]		

Source	Acceptance Criteria according to Landfill Directive (2003/33/EC) Section 2.3.1		Section 2.4.1		AT		SI	DE [DE 2005]	DE 2007C
Description of applied method	Percolation test	L/S = 10 l/kg	Percolation test	L/S = 10 l/kg	L:S = 10:1	Concentration in liquids	Concentration in liquids		
Unit	mg/l	mg/ kg DM	mg/l	mg/ kg DM	mg/ kg DM	mg/l	mg/l	mg/l	mg/l
AOX					100	10	10		1.5
Phenols (index)					1	100	100		50
Drying residue							10000[3]		
DOC	250	800	320	1000					
TDS		60000		100000					
Sum of Selenium and Tellurium							5		

1) for natural soil 3.5

2) to soil a limit value of 50mg/ kg DM applies

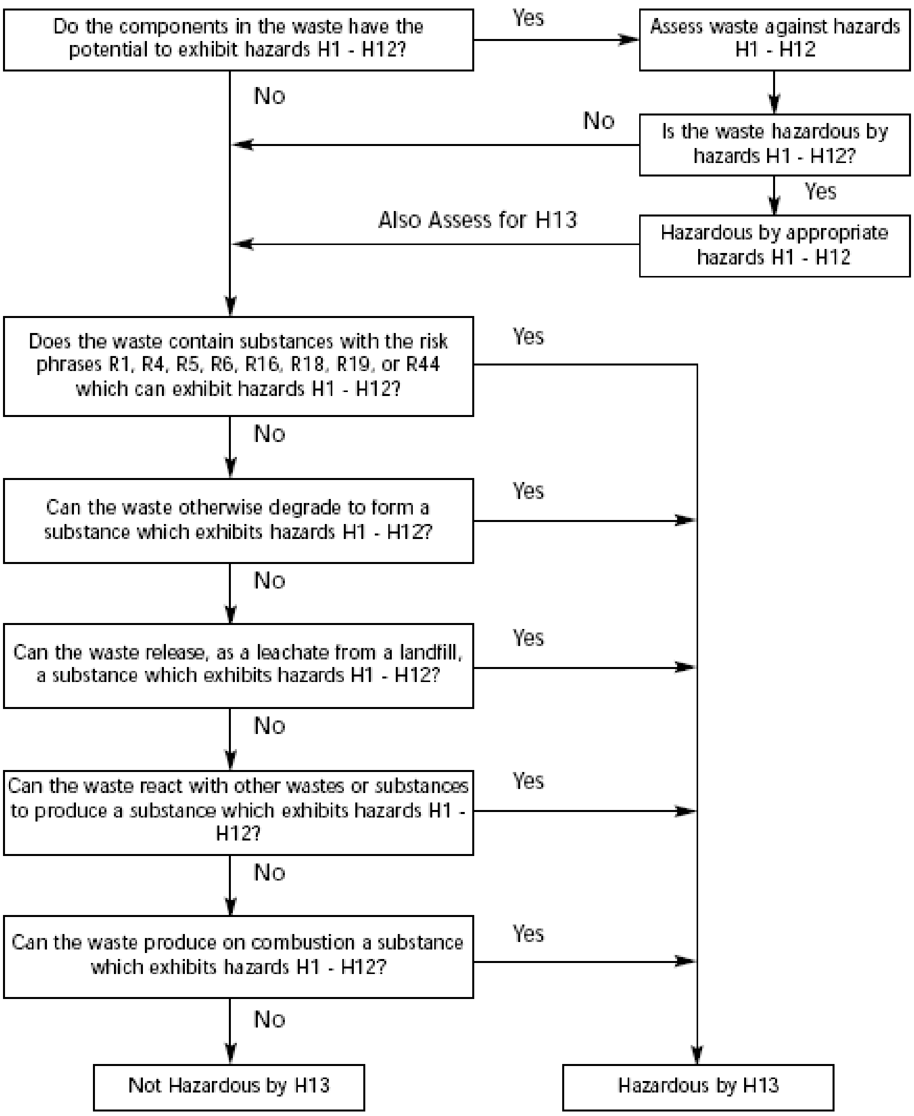
3) The value for liquid waste is 30000mg/l

4) The value for liquid waste is 2 –11.5

5) For ground polluted with oil and wastes from the production of petroleum the leachate value is 5 mg/l

6) Centrifugated leachate

10.3 Decision Tree for the assessment process for hazards H13 according to Technical Guidance WM 2.1 Appendix C Figure C13.1 [UK 2006]



1.1. Overview of answers to the questionnaire survey regarding H13

The following sections consider the responses concerning H13 from all questionnaires

Application of H13 in Member States

Question 31:

- *Is the criterion H13 applied in your country?*

Table 1: Answers to question 31 concerning the application of H13

Criterion is applied in:	AT, DE, DK[2)], FI, HU, SI, UK, LV, ES
No information available whether H12 is applied in:	EE
H12 is not applied in:	NL, SE, IT, FR[1)]

1) FR: Information from Arcelor and FNADE

2) DK: Information from DAKOFA

Methods for determination and concentration limits applied

Question 32

- *Which methods are used to determine whether a waste should be classified as hazardous on account of the criterion H13?*
    - *Please describe the calculation, the test methods and/or other approaches used.*
    - If analytical methods are applied:
        - which parameters are analysed?
        - which concentration levels are applied

Question 33

- *What is your experience with the applied methods? What are the advantages and shortcomings? Please give an assessment, in particular with regard to the relevance of the results and the (analytical) burden on companies.*

Answers

Table 6: Methods and limit values limits for H13 (Answers to question 32)

Country	Description of methods, parameters and limit values
AT	Methods and thresholds according Annex 3 of the Austrian Ordinance on Waste classification 2003/ 570 (Anlage 3 der österreichischen Abfallverzeichnisverordnung 2003/570). There are defined: • Threshold values for total content of inorganic substances by using the aqua regia dissolution (Hg, As, Cd) • Threshold values for total content of organic substances, such as PAH, PCB, PCDD, POX, BTEX, phenols) • Threshold values for eluates • Values for total contents for organic and inorganic substances in liquids
DE	In Germany there is no comprehensive specification for H13 but an approach assessing the potential leachability of waste compounds by the use of eluate analysis is established (see ‚Guidelines on the Application of the Waste Catalogue Ordinance’). For the leaching process a bundle of methodology is available depending on properties of waste. The best established methods are batch leaching procedures with different ratios of solid/water phase. (The questionnaire DE-SA simply refers to DIN EN 12457-4) Recently a new method was set up and is currently evaluated by a ring test (short-time column percolation elution method for especially mineral waste material). Parameters and limit concentrations for eluates are defined in Annex III of the “Guidelines on the Application of the Waste Catalogue Ordinance” are applied. (Regarding the limit values Germany is in compliance with *the leaching limit values for waste that is acceptable at landfills for non-hazardous waste acc. to section 2.3.1 of Directive 2003/33/EC*). Additional limit value: total content of hydrocarbons > 8000mg/kg.
DK	According to DAKOFA, Denmark has not established specific methods or concentration levels. Waste producers are advised to determine whether the waste includes substances classified with R-phrases R1, R4, R5, R6, R16, R18, R19 or R44.
FI	The evaluation is made by using tests and criteria established for the acceptance of waste to landfills.
HU	HU applies the methods and concentration limits according to the Landfill Directive. In case of components for which no limit values exist in the Landfill Directive the Waste Classification Board of Hungary should decide on the classification.
SI	SI refers to the test methods, criteria and limit values as laid down in Directive 1999/31/EC and related Decisions. Leachate test are carried out according to the standard EN 12457. Limit values are set for the total content, for leaching values and for liquid wastes for heavy metals and organic parameters. The limit values are given in the Annex. According to Slovenia, the applied methods are too difficult and expensive due to a large number of measured parameters.
UK	UK refers to the definitions, methods and concentration limits described in Chapter C13 of “WM2 – Appendix C”. UK does not limit the application of H13 to the leachability of waste but has a broad understanding of H13: “The hazard applies if the waste forms other substances e.g. through degradation, through reaction with other wastes or substances, through incineration or other forms of treatment. H13 does not cover reactions which yield materials which are ecotoxic (hazard H14).“ Hazard H13 may arise from substances classified with R-phrases R1, R4, R5, R6, R16, R18, R19 or R44. The test methods and limiting concentrations for hazards H1–H12 are set out in Appendices C1–C12.

	For certain substances and preparations the limiting concentrations for hazard H13, may be calculated from the expected reaction and the likely concentration or production rate of new substance that will be produced. This can then be assessed against the available limits for hazards H1 to H12. In the case of waste combustion, the likely products may be evaluated and concentrations estimated. The combustion product of the waste can be assessed for hazards H1 to H12.
ES	ES applies leaching tests according to national Order 13/10/89 pto.7 Appendix 3 using two indicators according to Appendix IV: luminescence and inhibition (Daphnia test). In addition, the methods and parameters laid down in Decision 2003/33/EC are applied.

Relevant waste types

Question 34

- *For which waste types the property H13 might be relevant according to your experience? Please name the LoW-codes.*

Answers

DE, SI and ES provided information on relevant waste types. The codes and descriptions are shown in Table 19. The table shows the waste sections and waste types named in the questionnaires shaded in grey; the waste chapters without shading were included only to facilitate the understanding of the table by providing information on the higher classification level.

Table 19: Waste types for which the hazard property H13 might be relevant (Answers to question 34)

LoW code	LoW designation	Countries
01	wastes resulting from exploration, mining, quarrying, physical and chemical treatment of minerals	
01 03	wastes from physical and chemical processing of metalliferous minerals	DE
01 04	wastes from physical and chemical processing of non-metalliferous minerals	DE
01 05	drilling muds and other drilling wastes	DE
06	wastes from inorganic chemical processes	
06 03	wastes from the MFSU of salts and their solutions and metallic oxides	DE
06 06	wastes from the MFSU of sulphur chemicals, sulphur chemical processes and desulphurisation processes	DE
10	wastes from thermal processes	
10 01	wastes (from thermal processes) from power stations and other combustion plants (except 19)	DE
10 02	wastes from the iron and steel industry	DE
10 08	wastes from other non-ferrous thermal metallurgy	DE
10 09	wastes from casting of ferrous pieces	DE
10 10	wastes from casting of non-ferrous pieces	DE
10 11	wastes from manufacture of glass and glass products	DE
10 12	wastes from manufacture of ceramic goods, bricks, tiles and construction products	DE
11	wastes from chemical surface treatment and coating of metals and other materials; non-ferrous hydrometallurgy	
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)	DE
11 02	wastes from non-ferrous hydrometallurgical processes	DE
17	Construction and demolition wastes (including excavated soil from contaminated sites)	
17 01	concrete, bricks, tiles and ceramics	DE

17 05	soil (including excavated soil from contaminated sites), stones and dredging spoil	DE, SI
17 08	gypsum-based construction material	DE
17 09	other construction and demolition wastes	DE
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	DE
19 02	Wastes from physico/ chemical treatment of waste (including dechromatation, decyanidation, neutralisation)	
19 02 05*	Sludges from physico/ chemical treatment containing dangerous substances	ES
	Any Type of sludge and other granular wastes	ES, SI
	All mineral waste	SI

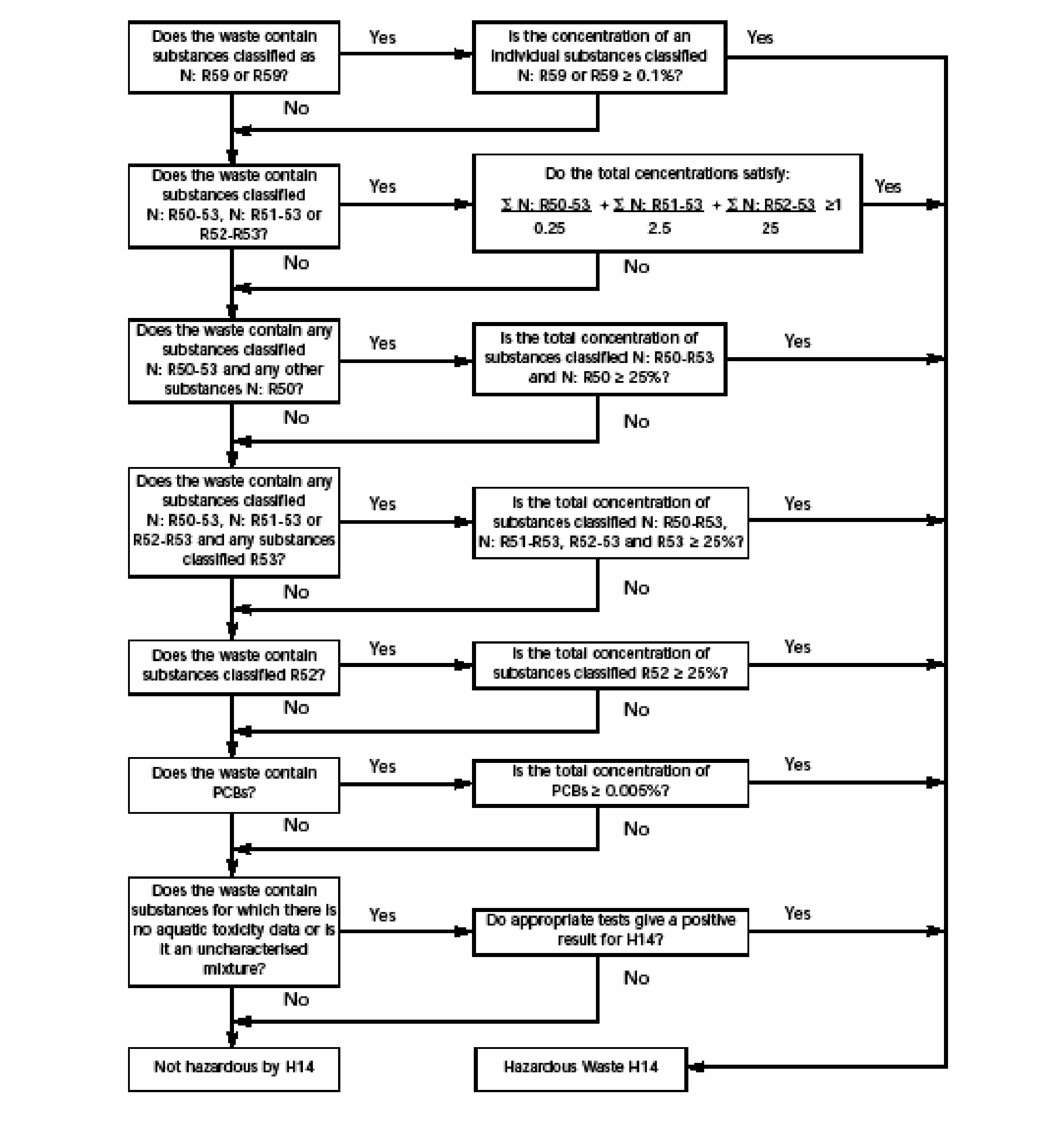
11 Detailed Information on H14

11.1 Assessment of H14 – limiting concentrations and calculation methods for the aquatic environment according to Technical Guidance WM 2.1 Appendix C [UK 2006]

There are six possible classification combinations:

N, R50: Very toxic to aquatic organisms	
Acute toxicity	96 hr LC50 (for fish): ≤ 1 mg/l; or 48 hr EC50 (for daphnia): ≤ 1 mg/l; or 72 hr IC50 (for algae): ≤ 1 mg/l
N, R50-53: Very toxic to aquatic organisms and may cause long-term effects in the aquatic environment	
Acute toxicity:	96 hr LC50 (for fish): ≤ 1 mg/l; or 48 hr EC50 (for daphnia): ≤ 1 mg/l; or 72 hr IC50 (for algae): ≤ 1 mg/l
	and the substance is not readily degradable or the log Pow (log octanol/water partition coefficient) ≥ 3.0 (unless the experimentally determined bioconcentration factor (BCF) ≤ 100).
N, R51-53: Toxic to aquatic organisms and may cause long-term effects in the aquatic environment	
Acute toxicity:	96 hr LC_{50} (for fish): 1 mg/l < LC_{50} ≤10 mg/l; or 48 hr EC_{50} (for daphnia): 1 mg/l < EC_{50} ≤10 mg/l; or 72 hr IC_{50} (for algae): 1 mg/l < IC_{50} ≤10 mg/l
	and the substance is not readily degradable or the log Pow ≥3.0 (unless the experimentally determined BCF £ 100).
R52-53 Harmful to aquatic organisms and may cause long-term effects in the aquatic environment	
Acute toxicity:	96 hr LC_{50} (for fish): 10 mg/l < LC_{50} ≤100 mg/l; or 48 hr EC_{50} (for daphnia): 10 mg/l < EC_{50} ≤100 mg/l; or 72 hr IC_{50} (for algae): 10 mg/l < IC_{50} ≤100 mg/l
	and the substance is not readily degradable.
R52 Harmful to aquatic organisms	
Substances not falling under the criteria listed above, but which on the basis of the available evidence concerning their toxicity may nevertheless present a danger to the structure and/or functioning of aquatic ecosystems.	
R53 May cause long-term effects in the aquatic environment	
Substances not falling under the criteria listed above, but which on the basis of the available evidence concerning their persistence, potential to accumulate, and predicted or observed environmental fate and behaviour may nevertheless present a long-term and/or delayed danger to the structure and/or functioning of aquatic ecosystems. For example, poorly water soluble substances, i.e. substances with a solubility of less that 1 mg/l, will be covered by these criteria if: the substance is not readily degradable; or the log Pow ≥3.0 (unless the experimentally determined BCF ≤100).	

11.2 Decision Tree for the assessment process for hazards H14 according to Technical Guidance WM 2.1 Appendix C Figure C14.1 [UK 2006]



11.3 Ecotoxical Approach according to methodological guide waste classification Appendix 3 [FNADE 2003]

Pillars of the Ecotoxical Approach [FNADE 2003]:

Basel agreement proposes to determine inherent danger of waste in connection with its ecotoxic character.

Evaluation strategy stands on :

- approach based on waste presence in the list of hazardous and non-hazardous waste of the agreement (see chapter 15, page 8). If waste is in no list, then stage 2 is applied.
- approach on the chemical substances content in waste (see chapter 2.2 stage 4, page 14).

Evaluation of the ecotoxic character is made by comparison with substances present in waste and ecotoxic characteristics, registered and available in OCDE recommendations of 1998, and for preparations (that is to say mixture of two or more components) , reference to classification system of chemical preparations for water toxicity may be done.

Uncompleted future approach ecotoxicologic tests.

Method in water:

Daphnia magna 48h (ISO 6341)
Daphnia magna 21 days (ISO 10706)
Alga 72 h (ISO 8692)
Methods on ground soil :
Higher plants emergence and growth 14 days (ISO 11269 1 & 2)
Earthworms 14 days (ISO 12 268-3)
Collembola (ISO 11267)

Methods on ground soil:

Higher plants emergence and growth 14 days (ISO 11269 1 & 2)
Earthworms 14 days (ISO 12 268-3)
Collembola (ISO 11267)

11.4 Exotoxicity tests on Waste according to methodological guide waste classification Stage 4 [FNADE 2003]

Stage 4	Ecotoxicity test with eluate obtained with X 30402-2 standard
If all controls are negatives Non-Hazardous waste	Reference value for acute toxicity tests : EC 50 < 10% **TEST n°1: Microtox test ISO 11348-3** Eluate concentration determination which after 5, 15, and 30 minutes inhibits bacteria luminescence of 50% **If EC 50 > 10% (negative response to the test) => applied TEST n°2** **If EC 50 < 10% (positive response to the test) = HAZARDOUS WASTE** **TEST n°2: NF EN ISO 6341 immobilization test on Daphnia magna** Concentration determination which in 24 h or 48 h immobilized 50% of Daphnias **If EC 50 > 10% (negative test) => applied TEST n°3** **If EC 50 < 10% (positive test) = HAZARDOUS WASTE** Reference value for chronic toxicity tests : EC 20 < 1% **TEST n°3: NF T90-375 inhibition test on growth algae** Concentration determination which after 7 days inhibits algae growth of 20% **If EC 20 > 1% (negative test) => applied TEST n°4** **If EC 20 < 1% (positive test) = HAZARDOUS WASTE** **TEST n°4: NFT90-376 Cerio Daphnia dubia inhibition growth test** Concentration determination which after 7 days inhibits 20% of population growth **If EC 20 >1% (negative test) => NO HAZARDOUS WASTE** **If EC 20 < 1% (positive test) = HAZARDOUS WASTE** **Or TEST n°4 bis: NFT90-377 Brachionus calyciflorus inhibition growth test** Concentration determination which after 48 h inhibits population growth of 20% **If EC 20 >1% (negative test) => NON- HAZARDOUS WASTE** **If EC 20 < 1% (positive test) = HAZARDOUS WASTE**
STAGE 5 (Optionnal)	Test on raw waste
	TEST n°5: ISO 11269-2 effects of the pollutants on the emergence of higher plants Waste quantity determination in substratum which after 14 to 21 days inhibits seeds growth of 20% **TEST n°6: X 31-251 effects of the pollutants on earthworms** Waste quantity determination in substratum which is lethal for 50% of the population in 14 days

11.5 Overview of answers to the questionnaire survey regarding H14

The following sections consider the responses concerning H14 from all questionnaires.

Application of H14 in Member States

Question 35:

- Is *the criterion H14 applied in your country?*

Answers

Table 4: Answers to question 35 concerning the application of H14

Criterion is applied in:	EE, SE, FI, UK,SI, LV, BG, HU, DE, NL, DK[1], AT, FR[2], ES
Criterion is not applied in:	IT
It is not known whether the criterion is applied in:	LT, RO

1) DK: Information was provided by DAKOFA

2) FR: Information provided by FNADE

Applied definitions to define "ecotoxicity"

Question 36:

- *Which definitions are used to define "ecotoxicity" and on which legal documents are they based?*

Answers

Table 5: Answers to question 36 concerning the used definitions for H14

Definition	Legal document	Used by
"substances and preparations which present or may present immediate or delayed risks for one or more sectors of the environment"	Directive 91/689/EEC	EE[1], FI, LV, LT, BG, HU, NL[2], ES
"substances and preparations which are dangerous for the environment; substances and preparations which, were they to enter the environment, would or could present an immediate or delayed danger to the environment"	Dangerous Preparations Directive 1999/45/EC	SE, UK, DE
Other definitions	-	-

1) Estonia refers to Directive 91/689/EEC but seems to have adapted the definition by including the wording 'dangerous for the environment' from Directive 1999/45/EC (Wording of Estonian Definition: *Substances and preparations which are ecotoxic or dangerous for the environment and present or may present immediate or delayed risks for one or more sectors of the environmen)t*

2) NL refers to definition for H14 based on Directive 91/689/EEC and to R50/53 according to Directive 67/548/EEC

Methods for determination and concentration limits applied

Question 37:

- *Which methods are used to determine whether a waste should be classified as hazardous on account of the criterion H14?*
    - *Please describe the test methods and/or other approaches used.*
- *If test methods are applied:*
    - *which parameters are analysed?*
    - *which concentration levels are applied*

Answers

Table 6: Methods and approaches used in Member States for the application of H14

Country	Description of methods and decision criteria
AT	H 14 applies for: • wastes with a total yield of FCKWs, HFKWs, FKWs and Halones over 2000 mg/kg DM, and • environmental hazardous substances due to class 9, M6 and M7 ADR (Annex 3 of Austrian Ordinance of Waste Classification2003/570)
BG	H14 is determined by means of fish ecotesting with Poecillia Reticulata, ecotesting with fluorescent micro organisms, ecotesting with phytocultures
DK	Waste producers are advised to determine/detect whether their waste obtain substances classified with R50-53 in the official list of dangerous substances and then to follow the regulation on chemicals to determine whether it occur in concentrations exceeding the general limits (or if such exist the specific limit laid down in the list). The same goes for substances classified with R59 (ozone depletion). There are no official definitions as for other properties under 'Ecotoxic'
EE	Principally the same methods described in EU chemical legislation (e.g. DIRECTIVE 1999/45/EC) for determination of ecotoxicity of substances and preparations can be applied and used for determination of the criterion H14.
FI	In cases where a substance is classified as ecotoxic in the Chemicals Legislation, the limit values of Chemicals Legislation are used also for evaluation of ecotoxicity of the waste. Otherwise using of ecotoxicity tests such as Vibrio fischeri (ISO 11348-3), Daphnia magna (EC Directive 67/548/EEC annex V method C2), algae test (EC Directive 67/548/EEC annex V method C3), various plant tests. It is recommended to use a combination of several tests.
FR (FNADE)	For landfilling scenario, the H14 approach is described in the FNADE guidelines and is based on three types of test: • On leachate ◦ 2 Acute toxicity test s: ISO 11348-3 and ISO 6341 ◦ 2 Chronic Toxicity test : inhibition of algal growth, Cerio daphnia dubia , or brachionus calyciflorus. • On raw material waste : ◦ ISO11269-2 and pollutants effects on worm For more details please refer to the FNADE guidelines. The tests above were chosen after a common study SITA /ADEME on 10 mirror entries wastes. The most discriminating ones were retained. The methodology has also an economical approach: starting with acute test (the less expensive) to the chronic, more longer and more expensive. If for the 1. step the result is positive so wastes is hazardous

<table>
<tr><th>Country</th><th>Description of methods and decision criteria</th></tr>
<tr><td>DE</td><td>At present, the criterion H14 is implemented by concentration limits for R-phrases to the category of danger “dangerous for the environment”
Waste material is classified as hazardous by exceeding the following concentration limits (see 1999/45/EG):
total concentration of ≥ 0.25% of one or more substances classified as dangerous for the environment with R phrases R50 – R53.
total concentration of ≥ 2.5% of one or more substances classified as dangerous for the environment with R phrases R51 – R53.
total concentration of ≥ 25% of one or more substances classified as dangerous for the environment with R phrases R52 – R53.
total concentration of ≥ 0.1% of one or more substances classified as dangerous for the environment with R phrases R59.
For ecotoxicological characterisation of waste the use of biological test systems is recommended. The basis test battery includes aquatic and terrestrial biotests, for which test specific limit values are defined to identify an ecotoxic signal in the test system. In order to differ between hazardous and non hazardous waste, which means referring the test signal to a hazard classification, the determination of threshold values is intended.
The recommendation is based on an evaluation study (Ringtest) of the ‘EN 14735: Characterization of waste – Preparation of waste samples for ecotoxicity test.
Table: Overview of limit values for different ecotoxilogical tests<table><tr><td>Basic test battery</td><td>Test organism</td><td>Reference</td><td>Limit values</td></tr><tr><td rowspan="3">Eluate testing</td><td>Algae</td><td>DIN EN ISO 8692</td><td>25%</td></tr><tr><td>Daphnids</td><td>DIN ISO 6341</td><td>20%</td></tr><tr><td>Salmonella typhimurium</td><td>ISO 13829</td><td>Dmin ≥ 2</td></tr><tr><td rowspan="2">Solid waste testing</td><td>Earth worm</td><td>ISO 11268-1</td><td>20%</td></tr><tr><td>Plants</td><td>ISO 11269-2</td><td>30%</td></tr></table></td></tr>
<tr><td>HU</td><td>Ecological tests used by HU: fish test, daphnia magna, algae test, seedling test, soil tests.
Used concentration limits: Waste harmful to the living organisms of the environment whose distilled water extract displays adverse effects in a dilution of >100 to 1 in the Daphnia magna and the seedling test and of >50 to 1 in the bacteria, fish and algae test.</td></tr>
<tr><td>LV</td><td>The risk phrases R50 – R59 are taken into account. Not test methods are applied.</td></tr>
<tr><td>NL</td><td>Parameters applied: (Heavy) metals, PAH, PCB, pesticides, cyanide, tetrachlorethene, trichlorethene
As there are no specific concentration levels defined for H14 in decision 2000/532 the classification and concentration levels of H3-H8, H10 and H11 are applied.</td></tr>
<tr><td>SI</td><td>Waste is classified exotoxic:
it contains ozone depleting substances or
If it contains substances classified in Chapter 9 and marked with 11 and 12 according to the regulations on road transport
Various toxicity tests (acute/chronic) are carried out.</td></tr>
<tr><td>ES</td><td>The Spanish Ministerial Order on the characterisation of waste defines two procedures to determine the ecotoxictiy of waste and provides thresholds:
Acute toxicity to Daphnia magna (24h) LC50 = 750mg/L
Acute toxicity to Vibrio fischeri (15min) LC50 = 3000mg/L
For the Daphnia test most laboratories use the corresponding method acc. to Annex V of Directive 67/548/EC) or the ISO method. For the Vibrio test most laboratories refer to the ISO method.</td></tr>
<tr><td>SE</td><td>SE applies definitions and concentration limits laid down in the “Substance Directive” 67/548/EEC and the “Preparations Directive 1999/45/EC”
With regard to POPs reference is made to EC POPs-regulation, Annex 4 with regard to concentration limits.
“Last resort”-option is the possibility to carry out relevant bioassays for assessing acute and subchronic toxicity in aquatic and terrestrial environment.</td></tr>
<tr><td>UK</td><td>H14 is applied through Appendix C14 of the UK Technical Guidance WM2. This uses the CHIP (Chemical Hazard Information for Packaging and Labelling Regulations: implements the DSD and the DPD into UK law) as its source.
CHIP/DPD provide criteria, concentrations, and test methods only for the aquatic and ozone depleting risk phrases. UK has adopted these criteria, delivered primarily by the calculation method and chemical analysis of composition.
UK is currently revising the Document to include additional criteria from CHIP (and therefore the DPD).</td></tr>
</table>

Experience with applied methods

Question 38:

- *What is your experience with the applied methods? What are the advantages and shortcomings? Please give an assessment, in particular with regard to the relevance of the results and the (analytical) burden on companies.*

Answers

Table 7: Overview of experiences with methods for classification of H14 provided by the Member States

Information on experience provided:	EE, DE, FR[1], SE, UK
No information provided	BG, FI, HU, LV, LT, NL, PL, RO, AT[2]

1) FR: Information provided by FNADE

2) AT: information from industry (Treibacher Industrie AG)

Table 8: Experience with the application of H14 in practice

Country	Description of methods and decision criteria
AT	Since a classification in accordance with the ADR is necessary for the transport of wastes anyways the classifcation via ADR does not mean any additional burden for most wastes. The concentration of chlorofluorohydrocarbons is often known from the waste generating process and therefore no analysis is necessary.
EE	Analytical assessment of ecotoxicity is not as complicated as of toxicity, carcinogenicity or similar factor affecting human health
SI	Test methods are considered to sometimes lengthy and expensive.
ES	The applied toxicity tests (Daphnia magna, Vibrio fischeri) are relatively economic and simple. The Daphnia test is in general considered to be more ecologically relevant. As screening tests, however both seem suitable. Often there are problems due to the fact that wastes are complex matrices (coloured, oily, particulates, precipitates, etc). Considering that often the ecotoxicity test is the only real bioassay performed on waste, as it is by far the cheapest, it seems reasonable to use a test battery.
SE	The stringent exotox-hazard classification of zinc oxide has raised the question how suitable the reference to the chemical legislation is with regard to waste classification regarding ecotoxicity There are many practical problems applying the chemical legislation (dealing with separate metal compounds) in assessing hazards from metal containing solid waste, as its composition in its solid waste state in most case hardly can be analysed at a reasonable cost. In stead the stakeholder assessing his waste by leaching metals, has to cope with the problem of comparing metal concentrations in the leachate with the concentration limits for individual metal compounds to be found due to the hazard classification in the chemical legislation.
UK	Calculation methodology set forth in Chemical(Hazard Information for Packaging and Labelling) Regulations (CHIP) and the Dangerous Preparations Directive (DPD) supported by chemical analysis is clear and highly satisfactory. This aligns directly with chemical risk phrase classification systems and therefore with other hazardous properties The view on aquatic toxicity expressed by the OECD is correct. Animal testing of solid wastes is of little or no scientific value and generates results of debatable significance. Testing is often of poor quality, overlooks key criteria in relevant guidance, and results often suggest that the waste is non-hazardous where that is clearly not the case. In more than one case the analysis appears to have been undertaken principally because chemical analysis would show the waste to be hazardous, so ecotoxicity testing is being used (badly) in an attempt to obtain a different result. Thresholds for ecotoxicity, or reference to thresholds in the DPD, should be included in the LoW.

Relevant waste types

Question 39:

- *Can you give examples of waste types that are classified as hazardous on account of criterion H14 but would not be considered as hazardous according to any other H-criteria? If yes, please name the LoW-codes.*

Answers

The following summarises the waste sections and waste types for which the hazard criteria H14 is or could be relevant. The countries that mentioned the respective waste are shown in the last column. The waste types/sections named in the questionnaires are shaded in grey; the waste chapters and sections without shading were included only to facilitate the understanding of the table by providing information on the next higher classification level.

Table 9: Waste types for which the hazard property H14 might be relevant

LoW code	LoW designation	Countries
05	Wastes from petroleum refining, natural gas purification and pyrolytic treatment of coal	
05 06	Wastes from the pyrolytic treatment of coal	
05 06 97*	Oil-shale semi coke (additional Estonian waste code)	EE
10	Wastes from thermal processes	
10 01	Waste from power stations and other combustion plants(except 19)	DE
17	Construction and demolition wastes (including excavated soil from contaminated sites)	
17 06	Insulation materials and asbestos containing construction materials	
17 06 03*	Other insulation materials consisting of or containing dangerous substances	UK
19	Wastes from waste management facilities, off-site waste water treatment plants and the preparation of waster intended for human consumption and water for industrial use	
19 01	Wastes from incineration or pyrolysis of waste	DE, SE
19 01 11*	Bottom ash and slag containing dangerous substances	SE
19 01 13*	Fly ash containing dangerous substances	SE
19 01 15*	Boiler dust containing dangerous substances	SE

Additional information on relevant waste types are given in the following table.

Table 10: Additional information on relevant waste types

Country	Description of methods and decision criteria
DE	Based on the experience in Germany there is a manageable number of waste types, which needs to be classified exclusively according to H14. Most of the waste types are classified as hazardous according to other H-criteria Based on the experiences of the ecotoxicological characterization of waste, bottom ashes from the thermal treatment of municipal waste (section 19 01) is classified as hazardous according to H14 and none of the other hazard criteria are appropriate. This may also be the case for slugs from combustion, metallurgy and other ashes currently listed in mirror entries (section 10 01)
UK	Under the revised DPD that has yet to be fully implemented in the UK through revisions to CHIP, the thresholds for extremely ecotoxic substances have been lowered. These thresholds are now lower than for any other hazardous property. In future, any waste containing an extremely ecotoxic substance may therefore potentially be classified as hazardous solely on the basis of ecotoxicity. This is likely to include certain biocides/pesticides, certain medicines (anti-parasite), and perhaps a few metal compounds. These could conceivably occur in some sludges, treated wastes, contaminated land, as well as in off spec/ waste products. There are too many codes to list. However, 17 06 03* other insulation materials consisting of or containing dangerous substances might be an example - it is a mirror entry.

12 Detailed information on H7

12.1 Definitions of categories for classification of H7 according to Council Directive 67/548/EEC

For the purposes of classification and labelling, carcinogens are divided into three categories:

Category 1:

Substances known to be carcinogenic to man. There is sufficient evidence to establish a causal association between human exposure to a substance and the development of cancer.

Category 2:

Substances which should be regarded as if they are carcinogenic to man. There is sufficient evidence to provide a strong presumption that human exposure to a substance may result in the development of cancer, generally on the basis of:

(a) appropriate long-term animal studies

(b) other relevant information.

Category 3:

Substances which cause concern for man owing to possible carcinogenic effects but in respect of which the available information is not adequate for making a satisfactory assessment. There is some evidence from appropriate animal studies, but this is insufficient to place the substance in Category 2.

The following risk phrases apply:

Categories 1 and 2:

R45 *May cause cancer*

R49 *May cause cancer by inhalation*

Category 3:

R40 *Limited evidence of a carcinogenic effect*

12.2 Concentration limits for metal compounds according to Table 7 [DE 2005]

Properties	H4		H5	H6		H8		H14				H7, H11		H10	
	R41	R36 R37 R38		very toxic	toxic	R35	R34	R50-53	R51-53	R52 R53	R59	Cat. 1/2	Cat. 3	Cat. 1/2	Cat. 3
As				X			X1	X				X+			
Cd			X	X				X				X1		X7	
Cr VI	X1	X	X	X		X1		X				X			
Cu	X1	X1	X					X1							
Hg		X1	X1	X			X1	X							
Ni			X	X2				X1				X+		X2	
Pb			X	X1				X				X1,+	X+	X	
Sb			X		X		X1		X				X3,+		
Se					X			X							
Sn4	X1		X	X1			X1	X		X5			X1,+		X1
Tl		X1		X					X						
Zn		X	X1	X6			X1	X					X1,++		
Concentration limits in %	Σ>10	Σ>20	Σ>25	Σ>0.1	Σ>3	Σ>1	Σ>5	Σ>0.25	Σ>2.5	Σ>25	Σ>0.1	I>0.1	I>1	I>0.5	I>5

Σ = total value

I = individual value

+ H7 only; ++ H11 only

1 specific compounds only, see Substances Directive

2 tetracarbonyl nickel only

3 Sb2O3 only

4 except zinc tetrachloride, only zinc organic compounds

5 zinc tetrachloride only

6 trizinc diphosphide only

7 cadmium fluoride only

12.3 Criteria for hazardous property H13 according to Annex III [DE 2005]

According to [DE 2005], hazardous property H13 can generally be considered fulfilled if one of the following concentration limits is exceeded:

Parameter	**Criterion**
Antimony	> 0.07 mg/l
Arsenic	> 0.2 mg/l
Barium	> 10 mg/l
Lead	> 1 mg/l
Cadmium	> 0.1 mg/l
Chromium, total	> 1 mg/l
Copper	> 5 mg/l
Molybdenum	> 1 mg/l
Nickel	> 1 mg/l
Mercury	> 0.02 mg/l
Selenium	> 0.05 mg/l
Zinc	> 5 mg/l
Fluoride	> 15 mg/l

Total contents

Hydrocarbons > 8,000 mg/kg

If it is established that at least one of these concentration limits has been exceeded, the waste can be considered as hazardous.

12.4 Testing methods for heavy metals and organic sum parameters in solids and in eluate according to [DE 2005]

Analysis procedure - solids

Table shows analysis methods for measuring arsenic and heavy metals – solids (DIN EN 13657 (January 2003 edition)

Analysis parameter	Analysis method	Edition
Arsenic	DIN EN ISO 11969	November 1996
Lead, cadmium, chromium, copper, nickel and zinc	E DIN ISO 11047 DIN EN ISO 11885	May 2003 April 1998
Thallium	DIN EN ISO 11885	April 1998
Mercury	DIN EN 1483	August 1997
Cyanide	LAGA Guideline CN 2/79	December 1983
Asbestos	Federal Environment Ministry publication: Publication of analytical methods for taking samples of and testing the substances and substance groups listed in the Annex to the Order banning certain chemicals [23]	2003
hydrocarbons	E DIN EN 14039 in conjunction with LAGA guideline KW 04	January 2005 November 2004
Creosotes, PAHs, benzo(*a*)pyrene	DIN ISO 13877	January 2000
PCBs	for oils: EN 12766-1 or EN 12667-2 other, solid wastes: DIN ISO10382 DIN 38414 Part 20	2002 February 1998 January 1996
Benzene	Contaminated Sites Manual, Hesse Office for Geology and the Environment, Volume 7 Part 4	2000
Highly volatile halogenated hydrocarbons / halons	Contaminated Sites Manual, Hesse Office for Geology and the Environment, Volume 7 Part 4	2000

Analysis procedure - Eluates

Producing eluates to measure the parameters according to DIN EN 12457-4 "Characterisation of waste - Leaching; Compliance test for leaching of granular waste materials and sludges – Part 4: One-stage batch test at a liquid to solids ratio of 10 l/kg for materials with particle size below 10 mm (with or without size reduction)" (January 2003)

Analysis parameter	Analysis method	Edition
Antimony	DIN EN ISO 11885	April 1998
Arsenic	DIN EN ISO 11969 or, alternatively, DIN EN ISO 11885	November 1996 April 1998
Barium	DIN EN ISO 11885 or, alternatively, DIN EN ISO 14911	April 1998 December 1999
Lead	DIN 38406-E6 or, alternatively, DIN EN ISO 11885	July1998 April 1998
Cadmium	DIN EN ISO 5961 or, alternatively, DIN EN ISO 11885	May 1995 April 1998
Chromium (VI)	DIN 38405-D24	May 1987
Copper	DIN 38406-E7 or, alternatively, DIN EN ISO 11885	September 1991 April 1998
Molybdenum	DIN EN ISO 11885	April 1998
Nickel	DIN 38406-E11 or, alternatively, DIN 38406-E22	September 1991 March 1988
Selenium	DIN EN ISO 11885	April 1998
Mercury	DIN EN 1483	August 1997
Zinc	DIN 38406-E8-1 or, alternatively, DIN EN ISO 11885	October 1980 April 1998
Fluoride	DIN 38405-D4-1	July 1985

13 Proposal for additional waste codes/ sections and amendments of existing waste codes/ sections

13.1 Proposals from Member States and Stakeholders

Proposal for additional waste codes/ sections and amendments of existing waste codes/ sections from Member States

Proposed waste code/ sections and amendments	Reasons	Current classification	Proposed by
Chapter 01			
01 02 new section for waste from coal excavation and processing			Romania
01 02 01 waste from coal excavation			
01 02 02 waste from coal processing			
01 04 13 … including wastes from treatment of limestone and dolomite	Limestone and dolomite are Estonians biggest source for this category	Amended LoW code	Estonia
01 04 07 should also cover waste from abrasion			Spain
Chapter 02			
02 01 xx* hazardous animal carcasses		18 02 xx	Hungary
02 01 Pesticides		e.g. 02 01 08*, 20 01 19*	[LT 2005]
02 01/ 02 02 need of entries for hazardous waste			[UK 2005]
02 01 Code for waste soil (e.g. from champignons, pot plants)			Slovenia
02 03 xx Glyzerine from the production of biodiesel and fats or residues containing fats from the production of biodiesel	Wastes arise in considerable quantities		Sachsen-Anhalt (Germany)
02 03 Codes of this chapter should be more general to also cover sewage sludges			
02 04 04 Beet slice		02 04 99	Hungary
02 04 80 Beet pulp		Additional national code	Poland
02 05 98 Whey wastes	Entry is needed for keeping records	Additional national code	Estonia, Poland
02 07: Entry for a hazardous waste code e.g. ethanol-methanol-waste from spirits distillation	Section contains no entry for hazardous waste		Germany
Code for “stabilized material deriving from the processing of animal byproducts” such as meat and bone meal deriving from treatment plants			Spain
Codes for carcass meal and fats of animals			Sachsen-Anhalt (Gemany)

Proposed waste code/ sections and amendments	Reasons	Current classification	Proposed by
Code for residues from decanting of wine and distillation in wineries		02 07 05, 02 07 99	Spain
Code for substrates of organic matrix used in hydroponics (e.g. greenhouses)		02 01 99	Spain
Chapter 03			
03 01 waste code for padded furniture manufacturing needed			Slovenia
03 01 05 should be split into different codes	Materials have a similar composition but different recovery/ disposal routes		UK
03 02 97* wood preservatives containing phenols	In Estonia wood preservatives containing phenols are often used	Additional national code	Estonia
03 02 98* sludges containing wood preservatives	Entry allows to consider preservatives waste in form of sludge	Additional national code	Estonia, Slovenia
03 03 05 needs a mirror entry	Need of classifying waste as hazardous under respective chapter and section		Sweden
New section for waste of paper and the polygraphic industry			Italy
03 04 01* Paper and cardboard frm carboard and polygraphic industry containing hazardous substances			
03 04 02 Paper and cardboard frm carboard and polygraphic industry, other than those mentioned in 03 04 01*			
03 04 03* Slabs of aluminium used in printing containing hazardous substances			
03 04 04 Slabs of aluminium used in printing, other than those mentioned in 03 04 04*			
New section for waste from production and/ or processing of plastic laminate and decorative panels			Italy
03 05 01* Resin waste containing hazardous substances			
03 05 02 Resin waste other than those mentioned in 03 05 01*			
03 05 03* Aqueous washing solutions containing hazardous substance			
03 05 04 Aqueous washing soultions other than those mentioned in 03 05 04			
03 05 05* Waste and scrap of impregnated Kraft paper			
03 05 06* Waste and scrap of impregnated decorative paper			
03 05 07 Scraps and paper waste other than those mentioned in 03 05 05* and 03 05 06*			
03 05 08* Scraps and waste from paper relaese and/ or finishing containing hazardous substances			
03 05 09 Scraps and waste from paper relaese and/ or finishing other than those mentioned in 03 05 08*			
03 05 10 Offcuts abd waste from plastic film release and/ or finishing			

Proposed waste code/ sections and amendments	Reasons	Current classification	Proposed by
03 05 11 Laminate waste			
03 05 12 Waste from composite panels			
03 05 13 Powder, chips abd scraps of laminate and composite panels			
03 05 14 Waste from extruded thermoplastic coposite			
Code for dust and abrasion materials containing hazardous substances			Spain
Chapter 04			
04 02 Code for waste from confection and finishing of the textile industry			Italy
Mirror code of 04 02 19*			Italy
Code for wastes generated by leather, fur and textile production			Spain
Codes for waste from the production of textile fibres, leather, fur and wastes from the production of products from these materials	Wastes are not detailed enough		Slovenia
Chapter 05			
05 06 96* aqueous liquid waste containing phenols(phenol water)	Oil shale is the main category of solid fuel in Estonia. Therefore semicoke, phenol water and tarry waste are the main categories of waste	Additional national codes	Estonia
05 06 97* oil shale semicoke			
05 06 98* tarry waste from oil shake (‘fuses’)			
05 07 Extension to also include gas from pyrolytic treatment of coal and oil shale	Oil shale is the main category of solid fuel in Estonia	National Amendment	Estonia
Code for wastewater of on site sludge treatment containing hazardous substances			Spain
Chapter 06			
06 03 14 concerns solid salts and solutions but not sludge Proposal: to split this code into three codes for solid salts, salt solutions and salt sludges.		Sludges from calcium chloride production are classified in 06 03 99	Finland
Chapter 07			
Chapter 7: waste codes for products should be included	Waste codes are entirely restricted to wastes arising from the manufacturing process		UK
07 01 xx: Schlempen aus der Herstellung technischer Alkohole	Wastes arise in considerable quantities		Sachsen-Anhalt (Germany)
01 01 xx: Huminsäuren			
07 01 07 should also cover sludges from distillation of solvents			Spain
Wastes from biodiesel production have no code			
07 02 code for scrap rubber needed		07 02 99	Italy
07 04 14* Liquid wastes containing hazardous substances	Missing codes for liquid wastes and expired		Italy

Proposed waste code/ sections and amendments	Reasons	Current classification	Proposed by
07 04 15* Expired or unusable products containing hazardous substances	products		
07 04 16 Expired or unusable products, other than those of heading 07 04 14*			
07 05 15* Liquid wastes containing hazardous substances			
07 05 16* Unusable or expired medicines containing hazardous substances			
07 05 17 Unusable or expired medicines other than those of heading 07 05 16*			
Waste mycelium (fungus) from the production of pharmaceuticals in 07 05			Slovenia
07 06 13* Liquid wastes containing hazardous substances			Italy
07 06 14 Expired or unsuable products			
07 06 needs a code for the waste resulting from physical separation processes: Amendmneds of 07 06 07* and 07 06 08* are necessary			
Chapter 08			
In 08 03 “aqueous suspensions that contain hazardous substances” are not included			Spain
08 03 14* should be more general to include further kinds of sludge			
08 05 02* Filtering materials containing hazardous substances			Italy
08 05 03 Filtering materials, other than those of heading 08 05 02*			
Poly alcohols which make way for the Polyurethane foams			Spain
Print cartridges and other consumables from offices don’t have a code			
Chapter 09			
09 01 xx mixed waste from developer and fixer of the photographic industry	Lack of code leads to burden due to correct classification according to OECD	16 10 01	Poland, Spain
Chapter 10			
10 01 01 …, excluding 10 01 96 and 10 01 97	Oil shale is a huge industry in Estonia. Bottom and fly ash from oil shale power plants are the most voluminous categories of waste in Estonia	Additional national codes	Estonia
10 01 95 wastes from fuel storage and preparation of oil shale-fired power plants			
10 01 96* bottom ash, slag and boiler dust from combustion of heavy fuel oil			
10 01 97* oil shale bottom ash			
10 01 98* oil shale fly ash			
10 01 03 needs a mirror entry	Need of classifying waste as hazardous under respective chapter and section		Sweden
10 12 13 should have a hazardous mirror-entry			Spain

Proposed waste code/ sections and amendments	Reasons	Current classification	Proposed by
Specific code for wastes from biomass combustion plants			
Specific code for waste generated by rock wool manufacturing			
Code for "the slag merger of the aluminium salt"		10 10 03	Spain
Chapter 11			
11 01 17* Exhausted concentrated electrolytic baths			Italy
Galvanising slab zinc bottom dross			Slovenia
Chapter 12			
Mirror codes for 12 01 02, 12 01 03, 12 01 05 are needed			Spain
Code for dust and contaminated metal chips is needed			
12 01 18* needs a mirror code			Italy
12 01 22 Waste and scrap of ferrous materials			
12 01 23 Waste and scrap of non-ferrous materials			
12 01 24 Offcuts and waste plastics			
12 01 25 Offcuts and waste rubber			
Chapter 13			
Code for used fats generated by maintenance procedures is needed			Spain
Code for oil or oil-mixtures of compressors are needed			
Non-hazardous mirror entries for some codes	Some wastes might not be hazardous in all cases		UK
Chapter 15			
More detailed entries for 15 01 10*	Treatment of these waste can vary a lot; therefore there is a need for further codes		Hungary, Spain
More detailed entries for 15 01 11*			
More detailed entries for 15 02 02*	Codes are too superficial		Hungary
More detailed entries for 15 02 03			
Chapter 16			
Introduction of two codes for filters from ELV: - filters from vehicles containing dangerous substances (fuel and oil filters classified as 16 01 07) - - filters from vehicles except filters containing dangerous substances	LoW contains an entry for oil filters but not for fuel and air filters.	Fuel and air filters are classified as 16 02 21*	Poland, [LT 2005]
16 01 23* Engines and engine parts which contain hazardous substances		16 01 17	Italy

Proposed waste code/ sections and amendments	Reasons	Current classification	Proposed by
16 01 24 Engines and engine parts, other than those of heading 16 01 23*			
End –of-life vehicles and all types of waste from demolition and maintenance of vehicles are currently identified by the same codes although two chapters would be useful to differ. The following additional section is proposed: 16 12 Machinery and equipment damaged and/ or obsolete (other than those identified under 16 02 16 12 01* Machinery abnnd equipment damaged and/ or obsolete containing dangerous substances 16 12 02 Machinery and equipment damaged and/ or obsolete other than those mentioned in 16 12 01		16 01	Italy
16 02 should also include other discarded equipment than WEEE		National amendment	Finland
16 02 should be expanded to other equipment and apparatus	Difficulties to classify equipment and apparatus not containing electronic or electrical components	National amendment	Estonia
16 02 18* Fluorescent lamps	Additional codes for waste coming from electrical and electronic equipment are needed		Italy
16 02 19* Cathode Ray tube (CRT)			
16 02 20* LCD screens			
16 02 21* Residues and mixed waste glass from CRT containing hazardous substances			
16 02 22 Residues and waste glass, other than those mentioned in item 16 01 23			
16 02 23* Motherboard and printed circuit boards containing hazardous substances			
16 02 24 Motherboard and printed circuits, other than those mentioned in 16 02 23*			
16 02 25 Cables			
16 02 26* Devices with radioactive elements			
16 02 27* Plastic components containing hazardous substances			
16 02 28 Plastic components, other than those mentioned in 16 02 27			
16 02 29* Engines from discarded equipment containing hazardous substances			
16 02 30 Engines from discarded equipment, other than those mentioned in 16 02 29*			
16 02 31* Compressors from discarded equipment containing hazardous substances			
16 02 32 Compressors from discarded equipment, other than those mentioned in 16 02 31*			
16 02 97* other discarded equipment containing hazardous components	Difficulties to classify equipment and apparatus not containing electronic or electrical components	Additional national codes	Estonia, Finland
16 02 98 other discarded equipment and apparatus other than those mentioned in 16 02 97*			

Proposed waste code/ sections and amendments	Reasons	Current classification	Proposed by
16 03 07 edible oils and fats			Italy
16 05 xx containers	There are codes for chemicals and gases in containers but nor for containers		Hungary
16 05 10* Dust in pressure containers containing hazardous substances			Italy
16 05 11 Dust in pressure in containers, other than those mentioned in 16 05 10*			
16 06 07 Ni-Mh-batteries	The differentiation between lead-acid batteries for starting and industrial would be necessary in the light of the provisions of the directive 66/2006/CE which provides a breakdown between portable batteries, starter batteries, industrial batteries		Italy
16 06 08 Lithium batteries			
16 06 09* industrial lead batteries			
16 06 10* Plate waste or exhausted accumulators of lead, resulting from production processes and recycling			
16 06 11* Sludge from dough for the processing of plates, arising from the production processes of lead accumulators			
16 07 10* Tar residues from cleaning tanks			Italy
16 10 05* Rainwater collected and intended for off-site treatment, containing dangerous substances			
16 10 06 Rainwater collected and intended for off-site treatment, other than those mentioned in 16 10 05*			
Section for demolition waste from ship and other means used for the maritime transport	This wastes can only be coded with general or irrelevant codes		Italy
Chapter 17			
17 01 xx Gas and porous concrete		17 01 07	Sachsen-Anhalt (Germany)
17 02 04* should be divided into different codes for wood, plastics and glass	A separate code is needed in particular for contaminated wood which is an important waste stream in terms of quantity.	17 02 04*	Sachsen-Anhalt (Germany)
17 03 … coal or oil shale tar and tarred products	Tars from oil shale products are equalised with coal tar	Amended LoW codes	Estonia
17 03 01* definition extended to oil shale tar			
17 03 03* definition extended to oil shale tar			
17 04 10* definition extended to oil shale tar			
17 02 04* need of a non-hazardous mirror-entry	Most of these materials are non-hazardous		UK
Ammunition scrap iron containing dangerous substances		17 04 09*	Germany
Chapter 18			
18 01 94 used curative seamud (sapropel)	No direct entries exist to classify these wastes	Additional national codes	Estonia

Proposed waste code/ sections and amendments	Reasons	Current classification	Proposed by
18 01 95* antibiotics			
18 01 96* Medicines with narcotic and psychotropic effect			
18 01 97* medicines containing other dangerous active ingredients			
18 01 98* unsorted batches of medicines			
More codes for hazardous waste are needed in chapter 18	In HU, 80% of the human health care waste is allocated to 18 01 03*. On the basis of inspectorates supervision activity HU proposes to specify this code.	18 01 03*	Hungary
18 02 should include the same entries as 18 01, e.g. codes for animal tissue, blood from veterinary practice, animal carcasses			UK
Chapter 19			
19 05 xx Compost from sewage sludge	The current practice to classify such composts to 19 08 05 is not adequate.	19 08 05	Sachsen-Anhalt (Germany)
19 05 04 stabilised biological waste from mechanical biological treament plants	The inclusion of these codes would complete the section on waste from aerobic treatment of solid waste that is currently lacking		Italy
19 05 06 waste from biofilters			
19 05 07* Leachate treatment wastes containing hazardous substances			
19 05 08 Leachate treatment waste, other than those mentioned in 19 05 07*			
Codes for waste from biological treatment of hazardous waste	Such wastes are not covered yet		Hungary
19 06 07 waste from anaerobic (methanogene) fermentation of organic waste		19 06 99	Italy
Section 19 12 should distinguish between urban and industrial waste			Spain
19 12 98 Mixed non-hazardous manufacturing wastes, excluding municipal wastes (mixed manufacturing waste)	No possibilities to classify mixed industrial or manufacturing wastes which are not similar to household wastes	Additional national code	Estonia
Liquid waste from physico/ chemical treatment		19 02 11*	Hungary
Major fractions of 19 12 12 should have separate codes			Sachsen-Anhalt (Germany)
19 13 09* Soil and rocks from contaminated sites containing hazardous substances			Italy
19 13 10 Soil and rocks from contaminated sites, other than those mentioned in 19 13 09*			
19 13 11* River sediments, marine and lake containing hazardous substances			
19 13 12 River sediments, marine and lake, other than those mentioned in 19 13 11*			
Separate heading for physical treatment	Waste codes are too wide and wastes are treated too differently to sum them up	Wastes from physico/ chemical treatment	UK
Chapter 20			

Proposed waste code/ sections and amendments	Reasons	Current classification	Proposed by
Mirror entry for 20 01 39 plastics	Need of classifying waste as hazardous under respective chapter and section		Sweden
Mirror entry for 20 01 40 metals			
Mirror entry for 20 01 41 wastes from chimney sweeping			
20 01 42* Exhausted toner cartridges containind hazardous substances			Italy
20 01 43 Exhausted toner cartridges other than those mentioned in 20 01 42*			
20 01 44 Waste from combined multimaterial colletion (mixed waste?)			
20 01 95* antibiotics	No direct entries exist to classify these wastes	Additional national codes	Estonia
20 01 96* medicines with narcotic and psychotropic effect			
20 01 97* medicines containing other dangerous active ingredients			
20 01 98* unsorted batches of medicines			
20 03 03 should be split into different codes	Wastes have a similar composition but different recovery/ disposal routes		UK
20 03 08 waste from cleaning of beaches			Italy
20 03 09 waste from cleaning of containers			
20 03 10 waste from cleaning of canals			
20 03 98 Sorting residues of mixed municipal waste	These are wastes remaining after sorting of mixed municipal waste in specialised sorting facilities or after separate collection; does not belong to chapter 19	Additional national code	Estonia
Mirror entry for 20 03 03 street-cleaning residues			Sweden
20 03 03 street cleaning wastes should be split in two codes: - gully waste - street sweepings	These materials have quite different characteristics.	20 03 03	UK
Hygiene type wastes	No such entries exist		UK
Nappies from childcare facilities			
Feminine hygiene bins			
Dog collection bins			
20 03 xx code for separately collected biowaste from households and a code for separately collected commercial waste			Sachsen-Anhalt (Germany)
Code for construction and demolition waste from urban areas			Spain
Code for dead domestic animals			

Proposed waste code/ sections and amendments	Reasons	Current classification	Proposed by
Unclassified additional codes			
Not enough codes for the classification of WEEE		16 02	Bulgaria, Lithuania, UK, Poland
Codes for mixed waste are needed in all chapters and many sections of the LoW with the exception of chapters 17 and 20.	Otherwise huge amounts of mixed commercial and industrial waste being classified in chapter 20	20 03 01	UK
Sludge from on-site waste water treatment in different sections		e.g. 02 01 06	Bulgaria, Italy
Plastics (without PET) and PET (Packaging Directive)			Lithuania
Food, textile, etc. wastes generated during trading, transportation, etc. (out-of-date, damaged, forfeited goods)			
Oil contaminated soil taken from other sites than indicated in LoW			
Air filters, oil shock-absorbers indicated in end-of-life vehicles directive			
Mixed waste category in every chapter of the LoW	Otherwise huge amounts of mixed commercial and industrial waste being classified in chapter 20	20 03 01 17 09 04	UK
Printer cartridges		08 03 18	UK, Slovenia
Sanitary waste		18 01 04	UK
Raw meat from retail butcher shops			UK
Asbestos arising from households			
Sludges (hazardous and non-hazardous)			Italy
XX XX 98* other waste in different sections: 02 01, 02 02, 04 01, 04 02, 08 02	Need of classifying waste as hazardous under respective chapter	Classification as 99-code or in other sections	Sweden, Germany, Hungary
Code for waste from treatment of autoclave			Poland
Code for wastes containg solvents			Poland
Code for products with exceeded expiration dates			Slovenia
Codes for wastes from services (such as catering, padded furniture manufacturing, education, public administration)			Slovenia
Codes for spent rubber	Codes exist only for tyre rubber		Slovenia
Code for styrofoam			Slovenia
Classification of waste machinery			Slovenia
Single-use diapers			Slovenia
Consumables for computers			Slovenia
Audio and video equipment			Slovenia
New section for wastes from on-site waste water treatment facilities	All wastes from on-site effluent treatment could be consolidated in one new section either in chapter 16		MLU Sachsen-Anhalt(Germany)

Proposed waste code/ sections and amendments	Reasons	Current classification	Proposed by
	or chapter 19.		
New section for waste generated by the Sewing of textile materials and fabrics industry			Bulgaria
New section for waste generated during trading, transportation, export of goods			Lithuania
New chapter for “Wastes from off-site waste water treatment plants and the preparation of water intended for human consumption and water for industrial use”		Chapter 19	Estonia
New section for waste arising from the retail and commercial sector (restriction of chapter 20 to municipal waste)		In Chapter 20	UK
Code for films and photographic paper containing silver compounds			Spain
Code for films and photographic paper not containing silver compounds			Spain

Table: Proposal for additional waste codes and amendments of existing waste codes from stakeholders

Proposed waste code / amendment	Reasons	Current classification	Proposed by
Chapter 02			
02 01 xy* out--dated seeds	These seeds generally contain pesticides and should be treated in hazardous waste plant	02 01 99	Eucopro
Chapter 03			
03 03 03 Bleaching sludges from hypochlorite and chlorine processes	Fibre rejects and sludges that derive from bleaching with hypochlorite and chlorine processes have a content of chlorine which is rather different from other fibre rejects		Assocarta
03 03 07 to "…from pulping of recovered paper and cardboard other than 03 03 XX"	Amendment ccording to the European technical classification EN 643		Assocarta
03 03 XX mechanically separated metals wire from pulping of waste paper and cardboard		03 03 99	Assocarta
03 03 XY fabric, felts and belts from paper machine maintenance			
Chapter 10			
Inclusion of fly ash from other biomasses in code 10 01 03	Waste codes on ash from straw does not exist; just for wood		EURELECTRIC
10 02 16 mixes exclusively composed of non-hazardous wastes			Arcelormittal - Corporation
Chapter 16			
Separate code for non-recoverable mixed waste from sorting operations is needed under 16 XX XX			FNADE
Chapter 19			
Code for mixed non-recoverable waste from sorting of non-hazardous waste on site & code for non–recoverable waste from external sorting plants in chapter 19 is needed		20 01 99	FEAD
More detailed classification of WEEE in section 19 12			FNADE
Chapter 20			
Non-recoverable wastes of an external sorting plant could be named as 20 XX XX		20 01 99	FNADE
Missing codes for aerosols should be re-introduced in chapter 20 (hazardous and non-hazardous)	In the 2000 version of the Commission decision (2000/532/EC) , aerosols were classified as 20 01 22 but did not appear in the current version as amended in 2001		FEAD
Unclassified additional codes			

Proposed waste code / amendment	Reasons	Current classification	Proposed by
98-codes should be introduced as mirror entries for all 99-codes			FEAD
Detailed classification of WEEE	A detailed classification system is proposed by the WEEE-Forum		WEEE Forum
Calamine (zinc mineral)			Arcelormittal Industeel Loire
Animal meal falling outside the scope of the Animal By-Products Regulation – 2002/1774/EC			FEAD
Distinction should be made between filter cakes and sludge according to their inorganic/ organic, hazardous/ non-hazardous characteristic			FEAD

13.2 Proposals concerning WEEE provided by WEEE Forum

Current classification	Proposal for additional division of the current classification
Chapter 16 Wastes not otherwise specified in the list	
16 02 wastes from electric and electronic equipment	
16 02 11* discarded equipment containing chlorofluorocarbons, HCFC, HFC	appliances containing CFC/ HCFC foam insulation
	cabinets containing CFC/ HCFC foam insulation
16 02 13* discarded equipment containing hazarodus components other than those mentioned in 16 02 09 to 16 02 12	codes for each fraction such as:
	CRT appliances
	flatscreen appliances
	…
16 02 14 discarded equipment other than those mentioned in 16 02 09 to 16 02 13*	codes for each fractions (see proposal for 16 02 13*)
16 02 15* hazardous components removed from discarded equipment	Codes for relevant fractions such as:
	mercury components
	toner cartridges
	plastics
	…
16 02 16 components removed from discarded equipment other than those mentioned in 16 02 15*	metal fractions
	metal fractions containing non-metal compounds
	non-metal fractions
16 06 batteries and accumulators	
	16 06 xx mix of batteries
	16 06 xx new kinds of batterie such as NiMH, Li-containing batteries
Chapter 19 Wastes from waste management facilities, off-site waste waster treatment plants and preparation of watser intended for human consumption and water for industrial use	
19 10 wastes from shredding of metal containing wastes	
19 10 01 iron and steel waste	shredder fraction (>2% impurity)
	Other iron and steel waste
19 10 02 non-ferrous waste	shredder non-ferrous fraction,
	metal/ plastics mixture
	other shredder non-ferrous waste fractions
19 10 05* other fractions containing dangerous substances	codes for different fractions such as:
	mix of non-ferrousmetal shredder fractions with components to be removed and/ or hazardous substances,
	heavy shredder waste
	plastics
	…
19 10 06 other fractions other than those mentioned in 19 10 05*	same proposal as for 19 10 05* but without hazardous substances
19 12 wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified	
19 12 02 ferrous metal	iron fraction
	stainless steel fraction
19 12 03 all non-ferrous metals	Codes for different fractions such as:
	non-ferrous metal containing Fe substances
	non-ferrous metal fractions
	aluminium fractions
	…

Current classification	Proposal for additional division of the current classification
19 12 04 plastic and rubber	plastics
	rubber
	mixtures of plastics and rubber
19 12 11* other waste (including mixtures of materials) from mechanical treatment of waste containing dangerous substances	Codes for specific fractions such as:
	glass
	plastics
	metal/ non-metal compounds
	…
19 12 12 other waste (including mixtures of materials) from mechanical treatment of waste other than those mentioned in 19 12 11	residues from seperation
	shredder/ seperation waste
	dismantling/ shredder/ seperation waste

14 Proposals of unnecessary waste codes

Redundant code	Description of the code	Reasons for deletion	Prposed by
Chapter 05	Wastes from petroleum refining, natural gas purification and pyrolytic treatment of coal		
05 01	Wastes from petroleum refining		
05 01 13	boiler feedwater sludges	Waste from water preparation is classified under 19 09. There is no reason why a specific code would be necessary for the petroleum refining. (For other industrial sectors such a codes does not exist although waste from water preparation will arises in most sectors).	PL
Chapter 09	Wastes from the photographic industry		
09 01	Wastes from the photographic industry		
09 01 10	single-use cameras without batteries	The definition of three different codes for single-use cameras seems overly detailed because of: - low amounts; - increasing importance of digital cameras - difficult distinction with regard to batteries. Proposal: to delete all three codes and to assign single-use cameras to code 16 02 14 (discarded equipment other than those mentioned in 16 02 09 to 16 02 13) or to keep only one of the three entries.	PL
09 01 11*	single-use cameras containing batteries included in 16 06 01, 16 06 02 or 16 06 03		
09 01 12	single-use cameras containing batteries other than those mentioned in 09 01 11		
Chapter 10	Wastes from thermal processes		
10 01	Wastes from power stations and other combustion plants (except 19)		
10 01 26	wastes from cooling-water treatment	Waste could be assigned to section 19 09. There is no reason why a specific code would be necessary for power stations. (other than in the metal industry where the cooling water comes in contact with materials)	PL
10 xx xx	wastes from cooling-water treatment	Wastes for which the determining components are mostly independent from their origin could be summarised in one section within chapter 10. The wastes mentioned in the adjoining column are (non-exhaustive) examples.	DE-SA
10 xx xx	fluegas dusts and solid wastes from gas treatment		
10 09 / 10 10	wastes from casting of ferrous pieces / wastes from casting of non-ferrous pieces	The two sections could be consolidated in one section. The only difference is the casted material (ferrous/non-ferrous) which is not relevant for the classification of the waste.	DE-SA
Chapter 13	Oil wastes and wastes of liquid fuels (except edible oils, and those in chapters 05, 12 and 19)		
13 08	oil wastes not otherwise specified		
13 08 99*	wastes not otherwise specified	A 99-code with asterisk is not consistent with the concept of the LoW; the code should be changes into 13 08 98*.	PL
16	wastes not otherwise specified in the list	The respective waste types should be reintegrated into the substance-related waste codes	DE
16 03	off-specification batches and unused products	could possibly be deleted	LV
16 09	oxidising substances	The codes of this section are rarely used and the amounts are low. It is assumed that the respective waste types can by assigned to sector-specific codes. Proposal: to integrate section 16 09 into section 16 04 waste explosives (because such wastes often are explosive and because explosives generally contain oxidising substances)	PL
16 09 01*	permanganates, e.g. potassium permanganate		
16 09 02*	chromates, e.g. potassium chromate, potassium or sodium dichromate		
16 09 03*	peroxides, e.g. hydrogen peroxide		
16 09 04*	oxidising substances, not otherwise specified		

16 10	aqueous liquid wastes destined for off-site treatment	The relevant wastes can be classified under other more specific codes	DE-SA
16 10 01*	aqueous liquid wastes containing dangerous substances		
16 10 02	aqueous liquid wastes other than those mentioned in 16 10 01		
16 10 03*	aqueous concentrates containing dangerous substances		
16 10 04	aqueous concentrates other than those mentioned in 16 10 03		
Chapter 20	Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including seperately collected fractions		
20 01	Separately collected fractions (except 15 01)		
20 01 31*	cytotoxic and cytostatic medicines	An identical waste code exists in chapter 18 (18 02 07* cytotoxic and cytostatic medicines). The code in chapter 20 should be deleted it as it is unlikely that cytostatic wastes should be used in households or other institutions outside of medical institutions (DE, PL). Furthermore, a separate collection would hardly be possible as such medicine is not marked. (PL).	DE-SA, PL
Codes that are repetitions for the same type of waste			SE

15 Laboratory Analyses

Question 42 - 44:

- How many laboratory analyses are carried out in your country in order to determine whether a waste is hazardous or not? Please give the frequency (per year) and specify the number by waste codes and H-criteria. Please provide estimates if no statistics are available.
- If you are not able to provide the respective figures or estimates, where in your country might this information be available?
- Which laboratories carry out analyses to determine the hazard properties of waste on behalf of the waste generators, waste management companies or competent authorities? Please name the laboratories or attach a list, if possible.

Country	Summary of answers to questions 42 to 44
AT	Waste analysis data are transmitted to the Federal Ministry of Environment for declassification purposes in cases where a waste owner wants to demonstrate that a categorised hazardous waste is non hazardous. For this purpose between 300 to 500 wastes are examined every year. This number does not include those wastes where the result of testing is a hazardous property. The main wastes are contaminated soils, contaminated demolition waste as well as fly ash and slags from (waste) incineration. The main H-criterion examined is H 13. Most of the waste that is generated in Austria can be assigned to the Austrian Waste list without testing.
BG	The list of accredited laboratory in accordance with BDS EN ISO/IEC 17025 is on the web-site of BAS – www.nab-bas.bg.
DE	This data cannot be given and estimations are surely no appropriate instrument to assess the efforts caused by the implementation of the EWL in the European member states. The waste owner is not obliged to disclose the extension of his analytical characterisation. Some waste material is analysed for characterisation purpose, some waste material is checked for specific quality requirements (often necessary for reuse strategy) and some waste material is checked for transport regulation. A generalisation of the figures doesn't lead to a clear result, from which any measures should be derived. Based on the experience and the discussion with the authorities in charge of the Federal States, a sufficient lab infrastructure for physical-chemical and biological analyses is established in Germany. There are private-run and state-run labs on the market and a harmonised quality management is established. The accreditation bodies of the Federal States might be able to give a list of the labs, which are accredited for analysing waste and waste-related material.
DE-SA	In the Bundesland Sachsen-Anhalt 10 to 12 laboratories are active in environmental analysis. Information on two individual laboratories was provided as follows: • One laboratory that is specialising in waste analyses carried out 5,000 analyses per year of which 1,000 referred to H-criteria in general and 100 to H13 in particular. • Another laboratory carried out 5,500 analyses per year of which 2,500 concerned contaminated soil, 50 sewage sludge, 200 compost, 2,000 ashes, slag, recycling materials and other mineral materials, 50 waste oils and 700 concerned other waste types. The parameters that were analysed are not

Country	Summary of answers to questions 42 to 44
	known.
EE	No statistics are available and it is difficult to estimate the numbers because the analyses are done in different laboratories and usually by request of different organisations – County environmental authorities, Regional environmental inspectorates, Ministry of Environment etc. There is no common database concerning waste analyses in the country. Results of analyses made by order of companies are not open to public. EE provided list of the most important laboratories.
ES	The Ministry of Environment pointed to the competent authorities of the autonomous regions for information on the subject. An individual laboratory provided the following information: • Currently some 30 – 40 wastes per year are analysed to determine if they are hazardous or not using at least one toxicity test (Daphnia, skin irritation …). In the past, before the full acceptance of the lists, some 8 years ago these figure were much higher (some 120-140 waster characterised per year using an extensive chemical and biological battery of tests). • Names of several other laboratories are provided.
FI	FI named several accredited laboratories for waste analyses.
FR	FNADE provided the names of the most well known laboratories.
HU	No information available on the frequency of laboratory analyses. 31 laboratories analyse to determine whether a waste is hazardous or not (www.nat.hu)
IT	No information available on the frequency of laboratory analyses. Regional and provincial agencies for environmental protection have accredited laboratories for carrying out the analysis for characterisation and classification of waste.
LV	Practically only sewage sludge is analysed (on content of heavy metals). Laboratory analyses is performed e.g. by the Latvian Environment, Geology and Meteorology Agency (LEGMA).
NL	No information available on the frequency of laboratory analyses. NL provided information on six laboratories carrying out respective analyses.
SI	15 laboratories regularly perform analyses and waste assessments. The list of authorised persons is published on the following web address: http://www.arso.gov.si/varstvo%20okolja/odpadki/podatki/
UK	Defra has insufficient data on the frequency of analyses on which to base estimates, and is not aware that this information is collated centrally .

16 Classification of Batteries

AUSTRIAN ARGUMENTS

CLASSIFICATION OF ALL TYPES OF BATTERIES AS HAZARDOUS WASTES

Introduction:

Presently in the European Waste List the following batteries are classified as hazardous wastes (procedure of notification and consent in case of transfrontier shipment – future entry: A1170 unsorted batteries excluding mixtures of only list B batteries. Waste batteries not specified on list B containing Annex I constituents to an extent to render them hazardous):

EWL:

16 06 01* lead batteries

16 06 02* Ni-Cd batteries

16 06 03* mercury-containing batteries

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

Consequently the following entry for single use cameras with hazardous batteries can be found in the European Waste List (notification requirement in case of transfrontier shipment – non-listed waste)

EWL:

09 01 11* single-use cameras containing batteries included in 16 06 01*, 16 06 02* or 16 06 03*

Furthermore there is a relevant note in the EWL referring to hazardous components from electrical and electronic equipment, which may include accumulators and batteries mentioned in 16 06 and marked as hazardous; etc.

Presently all other batteries, not explicitly mentioned in a specific entry on the European Waste List are considered to be non-hazardous waste a priori and therefore could be classified as Green Listed wastes in the meaning of Annex III of the future Waste Shipment Regulation, entry B1090: waste batteries conforming to a specification, excluding those made with lead, cadmium or mercury (remark: e.g. Nickel metal hydride batteries, alkaline batteries, zinc-carbon batteries):

EWL:

16 06 04 alkaline batteries (except 16 06 03*)

16 06 05 other batteries and accumulators

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

Consequently there is also the following entry for single-use cameras containing non-hazardous batteries (Green Listed wastes in the meaning of Annex III of the future Waste Shipment Regulation, entry B4030 Used single use cameras, with batteries not included on list A)

EWL:

09 01 12 single-use cameras containing batteries other than those mentioned in 09 01 11*

On the other hand all types of electrolytes are classified as hazardous wastes in the present European Waste List:

16 06 06* separately collected electrolyte from batteries and accumulators

The Austrian Federal Ministry for Agriculture, Forestry, Environment and Water Management takes the view that in practise all batteries are to be classified as hazardous waste when applying the EC-hazard criteria, either due to their electrolytes or due to their anode/cathode materials. The relevant hazard criteria for different types of batteries are: H 13 leachate, H14 ecotoxic, H4 irritant, H5 harmful and H8 corrosive, when applying all EU-hazard criteria and their testing procedures.

Furthermore the classification of batteries under the transport regulations for dangerous goods should be borne in mind as well:

UN-class 9 (ECOTOXIC), UN-No: 3090 Lithium batteries

UN-class 9 (ECOTOXIC), UN 3091 Lithium batteries contained in equipment or lithium batteries packed with equipment

UN-class 8 (CORROSIVE), UN-No: 3028 batteries dry, containing potassium hydroxide solid (electric storage)

UN-class 8 (CORROSIVE), UN-No: 2800 batteries, wet, non-spillable (electric storage)

UN-class 8 (CORROSIVE), UN-No: 2794 batteries, wet, filled with alkali

UN-class 8 (CORROSIVE), UN-No: 2795 batteries wet filled with acid

UN-class 4.3 (EMITTING HAZARDOUS GASES IN CONTACT UPON WATER OR AIR), UN-No: 3292 batteries containing sodium or cells containing sodium

The following overview on various important battery systems (non-exhaustive listing; there are a huge amount of battery systems for special applications) and their chemical composition shall demonstrate that all batteries have to be classified as hazardous waste when applying the relevant EC-legislation.

Relevant battery types and their composition

1 . Zinc batteries

Zinc Carbon battery

Alkaline Battery

Zinc-Air battery

Zinc chloride battery

Zinc-Silver battery

2. Magnesium batteries

3. Lithium Batteries (Primary Cells)

Lithium Manganese dioxide battery

Carbon-Monofluoride Lithium battery

Lithium-Iron disulfide battery

Lithium-Sulphur dioxide battery

Lithum-Thyonyl Chloride battery

Lithium-Iodine Cells

4. Lithium-Ion Batteries (Secondary Cell)

Lithium Carbon battery

Lithium-Polymer battery

Lithium-Cobalt oxide battery and Lithium-Nickel oxide battery

Lithium-Vanadium battery

Lithium-Silver chromate battery

5. Nickel batteries (Secondary Cells)

Nickel–Iron battery

Nickel-Metal hydride battery

Nickel Zinc battery

6. Ammonia battery

7. Redox Batteries (Flow Cells)

8. Thermal Batteries

Sodium sulphur cells

Zebra Cells

9. Flow Batteries

1. ZINC BATTERIES

Zinc-carbon battery

Anode: zinc (zinc can).

Cathode: mixture of manganese dioxide and carbon powder.

Electrolyte: mixture of zinc chloride and ammonium chloride dissolved in water.

Typical composition of such batteries (safety data sheet of a producer):

MATERIAL OR INGREDIENT	PEL (OSHA)	TLV (ACGIH)	%/wt.
Acetylene Black (CAS# 1333-86-4)	3.5 mg/m^3 TWA (as carbon black)	3.5 mg/m^3 TWA (as carbon black)	3-7
Ammonium Chloride (CAS# 12125-02-9)	None established	10 mg/m^3 TWA (fume) 20 mg/m^3 STEL (fume)	0-10
Manganese Dioxide (CAS# 1313-13-9)	5 mg/m^3 CEILING (as Mn)	0.2 mg/m^3 TWA (as Mn)	15-31
Zinc (CAS# 7440-66-6)	15 mg/m^3 TWA (total dust as particulates not otherwise regulated) 5 mg/m^3 TWA (respirable fraction as particulates not otherwise regulated)	10 mg/m^3 TWA (inhalable particulate) 3 mg/m^3 TWA (respirable particulate)	7-42
Zinc Chloride (CAS# 7646-85-7)	1 mg/m^3 TWA (fume)	1 mg/m^3 TWA (fume) 2 mg/m^3 STEL (fume)	2-10

HAZARDOUS CHARACTERISTICS: ECOTOXIC, HARMFUL, CORROSIVE

- **MnO2 EG-No: 215-202-6, CAS: 1313-13-9** – Xn; R20/22; harmful by inhalation or ingestion – (limit: 25 % - Xn)

- **Ammonium chloride EG-No: 235-186-4; CAS: 12125-02-9** – Xn: R 22, Xi:36 (limit 20% Xi irritant, limit: 25%- Xn)

- **$ZnCl_2$: EG –No: 231-592-0, CAS: 7646-85-7** corrosive, irritant causes burns. Harmful if swallowed/inhaled and in contact with skin, Xn: R22; C: R34; N: R50/ R53.

  Concentrations:

  2,5< c >5% - N (ecotoxic), R51/53

  5<c>10% - Xn (harmful), N (ecotoxic) R36-37-38-51/53

- **Acetylene black (carbon black):** CAS No: 1333-86-4, EINECS: 215-609-9**,** not found in EC list of hazardous chemicals; IARC evaluation: possible human carcinogen (Group 2B). May be harmful by ingestion or inhalation. Respiratory irritant.

Alkaline battery (Alkaline Manganese Dioxide-Zinc Battery)

Anode: zinc metal as a powder.

Cathode: manganese dioxide and carbon mixture (often, the carbon is in a graphite or acetylene black form)

Electrolyte : caustic potassium hydroxide (KOH); The gelling agents are usually starch, polyacrylates, or ethylene maleic anhydride copolymers.

Typical composition of such batteries (safety data sheet of a producer):

MATERIAL OR INGREDIENT	PEL (OSHA)	TLV (ACGIH)	%/wt.
Graphite (CAS# 7782-42-5)	15 mg/m^3 TWA (total dust) 5 mg/m^3 TWA (respirable fraction)	2 mg/m^3 TWA (respirable fraction)	2-6
Manganese Dioxide (CAS# 1313-13-9)	5 mg/m^3 Ceiling (as Mn)	0.2 mg/m^3 TWA (as Mn)	30-45
Potassium Hydroxide (CAS# 1310-58-3)	None established	2 mg/m^3 Ceiling	4-8
Zinc (CAS# 7440-66-6)	15 mg/m^3 TWA PNOR* (total dust) 5 mg/m^3 TWA PNOR* (respirable fraction)	10 mg/m^3 TWA PNOC** (inhalable particulate) 3 mg/m^3 TWA PNOC** (respirable paeticulate)	12-25

* PNOR: Particulates not otherwise regulated
**PNOC: Particulates not otherwise classified

HAZARDOUS CHARACTERISTICS: IRRITANT/CORROSIVE, HARMFUL, ECOTOXIC

- **Potassium hydroxide:** EC-No: 215-181-3, CAS: 1310-58-3 harmful, corrosive R22-35;
  Concentrations:
  25%<c>100% -C(corrosive), R22-35

  5%<c<25% - C (corrosive), R35

  2%<c<5% - C (corrosive), R34

  0,5%<c<2% ; Xi (irritant) R36/38

- **Manganese dioxide MnO2** EG-No: 215-202-6, CAS**: 1313-13-9** – Xn; R20/22; harmful by inhalation or ingestion – (limit: 25 % - Xn, sum of harmful substances)

- **Zinc powder -** zinc dust (pyrophoric); EC-No: 231-175-3, CAS: 7440-66-6
  F (flammable); R15-17, N (ecotoxic); R50-53,

Zinc-air battery

Zinc-air batteries, also called "zinc-air fuel cells" (non-rechargeable) are powered by the oxidation of zinc with oxygen from the air.

Electrolyte: usually potassium hydroxide solution

Water and oxygen from the air react at the cathode and form hydroxyls which migrate into the zinc paste and form zincate, at which point electrons are released that travel to the cathode. The zincate decays into zinc oxide and water is released back into the system. The water and hydroxyls from the anode are recycled at the cathode; thus the water only serves as a catalyst.

Typical composition of such batteries (safety data sheet of a producer):

INGREDIENT NAME	CAS #	%	TLV*
Zinc	7440-66-6	30 - 40	2 mg/m^3 (ZnO, Dust, TWA)
Steel	7439-89-6	30 - 40	---
Nickel	7440-02-0	3 - 7	1.5 mg/m^3 (Elemental, TWA)
Copper	7440-50-8	1 - 5	1 mg/m^3 (TWA)
Chromium	7440-47-3	1 - 5	0.5 mg/m^3 (Metal, TWA)
Graphite	7782-42-5	1 - 3	2 mg/m^3 (TWA)
Potassium Hydroxide	1310-58-3	1 - 3	C 2 mg/m^3 (STEL)
Mercury	7439-97-6	< 1**	0.025 mg/m^3 (Inorganic, TWA)
Water, paper, plastic, other	---	Balance	---

**Source: ACGIH Threshold Limit Values for Chemical Substances and Physical Agents, 2003.*
*** Zinc Air Batteries contain less than 25 mg/cell of mercury.*

HAZARDOUS CHARACTERISTICS: IRRITANT/CORROSIVE, ECOTOXIC

→ **Potassium hydroxide:** EC-No: 215-181-3, CAS: 1310-58-3 harmful, corrosive R22-35; Concentrations:

5%<c<25% - C (corrosive), R35

2%<c<5% - C (corrosive), R34

0,5%<c<2% ; Xi (irritant) R36/38

→ **Zinc powder - zinc dust (pyrophoric); EC-No: 231-175-3, CAS: 7440-66-6**
F (flammable); R15-17, N (ecotoxic); R50-53,

→ **Mercury** EC-no: 231-106-7, CAS:7439-97-6, R23-33-50/653, T (toxic), N (ecotoxic)

Zinc-chloride battery

The Zinc Chloride battery is a beefed up version of the general purpose Carbon Zinc battery.

Typical composition of such batteries (safety data sheet of a producer):

INGREDIENT NAME	CAS #	%	TLV*
Steel ** **OR** Plastic **	7439-89-6 --	8 – 14 8 – 14	-- --
Manganese Dioxide	1313-13-9	28 – 32	0.2 mg/m^3 (TWA)
Zinc	7440-66-6	16 – 20	2 mg/m^3 (ZnO, Dust, TWA)
Acetylene Black	1333-86-4	7 – 13	3.5 mg/m^3 (Carbon Black, TWA)
Zinc Chloride	7646-85-7	6 - 10	1 mg/m^3 (Fume, TWA)
Lead	7439-92-1	< .02	0.05 mg/m^3 (TWA)
Water, paper, plastic, other	---	Balance	---

**Source: ACGIH Threshold Limit Values for Chemical Substances and Physical Agents, 2003.*

Data of another producer:

Chemical Name	CAS No.	Percentage %
Manganese Dioxide	1313-13-9	28
Zinc Metal	7440-66-6	22
Carbon Black	1333-86-4	6.1
Zinc Ammonium and Chloride Solution	2842-90-0	15.4
Others	N/A	.15

HAZARDOUS CHARACTERISTICS: ECOTOXIC, HARMFUL, CORROSIVE

- **MnO2 EG-No: 215-202-6, CAS: 1313-13-9** – Xn; R20/22; harmful by inhalation or ingestion – (limit: 25 % - Xn, sum of harmful substances)

- **Ammonium chloride EG-No: 235-186-4; CAS: 12125-02-9** – Xn: R 22, Xi:36 (limit 20% Xi irritant, limit: 25%- Xn, sum of harmful substances)

- **$ZnCl_2$: EG –No: 231-592-0, CAS: 7646-85-7** corrosive, irritant causes burns. harmful if swallowed/inhaled and in contact with skin, Xn: R22; C: R34; N: R50/ R53.

  Concentrations:

  2,5< c >5% - N (ecotoxic), R51/53

  5<c>10% - Xn (harmful), N (ecotoxic) R36-37-38-51/53

- **Acetylene black (carbon black):** CAS No: 1333-86-4, EINECS: 215-609-9, not found in EC list of hazardous chemicals;
  IARC evaluation: possible human carcinogen (Group 2B). May be harmful by ingestion or inhalation. Respiratory irritant.

Silver Zinc Batteries

Anode: zinc

Cathode: silver oxide

Electrolyte: alkaline electrolyte, usually **sodium (NaOH) or potasium hydroxide (KOH)**

→ can cause serious chemical burns to the skin and/or eyes

Mercury has been used in the past to suppress the corrosion, despite its harmful effects on the environment (limitations nowadays)

Typical composition of such batteries (safety data sheet of a producer):

INGREDIENT NAME	CAS #	%	TLV*
Silver	7440-22-4	<0.5	0.1 mg/m^3 (Metal, TWA)
Steel	7439-89-6	37 – 41	--
Zinc	7440-66-6	30 – 40	2 mg/m^3 (ZnO, Fume, TWA)
Potassium Hydroxide	1310-58-3	1 – 3	C 2 mg/ m^3 (STEL)
Graphite	7782-42-5	<0.25	2 mg/ m^3 (TWA)
Mercury	7439-97-6	<0.9**	0.025mg/ m^3 (Inorganic, TWA)
Manganese Dioxide	1313-13-9	<2.5	0.2 mg/ m^3 (Mn, TWA)
Water, paper, plastic, other	---	Balance	---

Other producer´s information : components in % weight

Silver Oxide (20667-12-3)	27-40
Zinc (7440-66-6)	7-11
Potassium Hydroxide (35%) (1310-58-3)	0-10
Sodium Hydroxide (20-30%) (1310-73-2)	0-10
Manganese Dioxide (1313-13-9)	0-3
Mercuric Oxide (21908-53-2)	<1

HAZARDOUS CHARACTERISTICS: IRRRITANT/CORROSIVE, ECOTOXIC

→ **Potassium hydroxide**: EC-No: 215-181-3, CAS: 1310-58-3 harmful, corrosive R22-35;
Concentrations:
5%<c<25% - C (corrosive), R35

2%<c<5% - C (corrosive), R34

0,5%<c<2% ; Xi (irritant) R36/38

- **Sodium hydroxide -No: 215-185-5, CAS: 1310-73-2**
  (corrosive : limit 1% of corrosive R34, 5 % of R35)

  5%<c<100% - C (corrosive) , R35

  2%>c>5% - C (corrosive), R34

  0,5%<c<2% - Xi (irritant), R36/38

- **Mercuric oxide** HgO CAS No: 21908-53-2, EC No: 244-654-7
  May be fatal if inhaled, swallowed or absorbed through the skin. Possible teratogen. Highly toxic. Danger of cumulative effects. Neurological hazard. R26 R27 R28 R63 R33 R36 R37 R38. Harmful in the environment. Toxic to aquatic organisms.

2. MAGNESIUM BATTERIES

Anode: magnesium
Cathode: manganese dioxide
Electrolyte: aqueous solution of **magnesium bromide or magnesium perchlorate**. These chemicals can emit highly toxic fumes when heated.

Typical composition:

Hazardous & Nonhazardous Components (Chemical Name, (Symbol), and [CAS#])	Exposure Limits* OSHA PEL	ACGIH	Other Recommended Limits	% by Item Weight
Magnesium-aluminum alloy		---		~10-15
Manganese dioxide (MnO_2)[1313-13-9]		0.2		~25-35
Magnesium perchlorate ($Mg(ClO_4)_2$)[10034-81-8]		---		~5-10
Barium Chromate ($BaCrO_4$)[10294-40-3]		0.05		~0.5-1.5
Lithium Chromate (Li_2CrO_4)[14307-35-8]		0.05		<0.01
Carbon, black (C), [1338-86-4]		3.5		~5-10

* All values reported in mg/m^3 unless otherwise specified.

HAZARDOUS CHARACTERISTICS: HARMFUL, ECOTOXIC

- **MnO2** EG-No: 215-202-6, CAS: 1313-13-9 – Xn; R20/22; harmful by inhalation or ingestion – (limit: 25 % - Xn, sum of harmful substances)

- **Bariumchromate** BaCrO4 CAS No: 10294-40-3 , Harmful if inhaled or swallowed. May be harmful by skin contact. Chronic exposure may cause cancer, liver and CNS damage. R20 R22 R45 possible carcinogenic; In the EC list of chemicals - barium compounds: EC –No:056-002-00-7; Xn R 20/22; 1%<c<100% -Xn

- **Magnesium perchlorate:** Mg(ClO4)2 , CAS No: 10034-81-8 oxidizind and irritant (O,Xi) R: 8-14/15-36/37/38; moisture sensitive.; oxidizer - Skin, eye and respiratory irritant. Risk phrases R8 R36 R37 R38; UN No 1475., class 5.1. Very hazardous in case of ingestion, hazardous in case of skin contact (irritant), of inhalation. Prolonged exposure may result in skin burns and ulcerations. – no entry in EC list of hazardous chemicals

- **Lithium chromate**, CAS Number: 14307-35-8 EC-No: 238-244-7; German Water Pollution Class 3; Carcinogen; - no entry in the EC-list of hazardous chemicals; R: 45-46-8-36/37/38_

- **Acetylene black (carbon black):** CAS No: 1333-86-4, EINECS: 215-609-9, not found in EC list of hazardous chemicals; IARC evaluation: possible human carcinogen (Group 2B). May be harmful by ingestion or inhalation. Respiratory irritant

3. LITHIUM BATTERIES (PRIMARY CELLS)

Lithium - Manganese Dioxide Battery

Anode: lithium foil

Cathode: manganese dioxide

Electrolyte: **organic solvent** (propylene carbonate-solvent and 1,2 dimethoxyethane solvent) solution of lithium perchlorate (in coin cells) or Lithium triflate –salt Li CF3So3

Typical composition of Lithium / manganese oxide batteries:

Lithium	7439-93-2	2.4
Propylene Carbonate	16606-55-6	9
Manganese Dioxide	1313-13-9	22
Dimethoxymethane	109-87-5	5.8
Lithium per Chlorate	N/A	1
Graphite	7784-42-5	5.5
Stainless Steel	N/A	50.5
Other	N/A	3.8

Other data:

MATERIAL OR INGREDIENT	PEL (OSHA)	TLV (ACGIH)	%/wt.
Carbon Black (CAS# 1333-86-4)	3.5 mg/m³ TWA	3.5 mg/m³ TWA	0-1
1,2-Dimethoxyethane (CAS# 110-71-4)	None established	None established	0-6
1,3-Dioxolane (CAS# 646-06-0)	None established	None established	0-8
Graphite (CAS# 7782-42-5)	15 mg/m³ TWA (total dust) 5 mg/m³ TWA (respirable fraction)	2 mg/m³ TWA (respirable fraction)	0-3
Lithium or Lithium Alloy (CAS# 7439-93-2)	None established	None established	1-6
Lithium Perchlorate (CAS# 7791-03-9)	None established	None established	0-3

MATERIAL OR INGREDIENT	PEL (OSHA)	TLV (ACGIH)	%/wt.
Lithium Trifluoromethanesulfonate (CAS# 33454-82-9)	None established	None established	0-3
Lithium Trifluoromethanesulfonimide (CAS# 90076-65-6)	None established	None established	0-3
Manganese Dioxide (CAS# 1313-13-9)	5 mg/m³ Ceiling (as Mn)	0.2 mg/m³ TWA (as Mn)	12-42
Propylene Carbonate (CAS# 108-32-7)	None established	None established	0-8

HAZARDOUS CHARACTERISTICS: HARMFUL, ECOTOXIC

- **MnO2** EG-No: 215-202-6, CAS: 1313-13-9 – Xn; R20/22; harmful by inhalation or ingestion – (limit: 25 % - Xn, sum of harmful substances)

- **Lithium perchlorate** LiClO4 : CAS No: 7791-03-9, O, Xi strong oxidizer - contact with combustible material may cause fire. Incompatible with organic materials, combustible materials, strong reducing agents. Skin, eye and respiratory irritant. – R36 R37 R38.

- **1,2-dimethoxyethane:** F flammable, T CAS11071- 4; R11 Harmful by inhalation, ingestion and through skin contact. Possible teratogen. May impair fertility; highly flammable; R11 R19 R20 R60 R61; not found in EC list of hazardous chemicals

- **1,3, dioxolane** CAS 646-06-0– F flammable, , R: 11, UN 1166 3/PG 2, German Water Pollution Class 1

- **Acetylene black (carbon black):** CAS No: 1333-86-4, EINECS: 215-609-9, not found in EC list of hazardous chemicals; IARC evaluation: possible human carcinogen (Group 2B). May be harmful by ingestion or inhalation. Respiratory irritant

- **Propylene carbonate** (carbonic acid cyclic methylethylene ester, carbonic acid propylene ester, cyclic 1,2-propylene carbonate), CAS No: 108-32-7 , EC No: 203-572-1, EC Index No: 607-194-00-1 , Xi Irritant. May be harmful by inhalation, ingestion or skin contact. Risk phrases - R36.

Carbon monofluoride lithium batteries Li (CF)x

Application: aerosepace, military and cardicac peacemakers

Cathode: Carbon monofluoride

Carbon monofluoride (CF, CF_x, or $(CF)_x$), also called polycarbon monofluoride, polycarbon fluoride, and poly(carbon monofluoride), is a material formed by high-temperature intercalation of fluorine gas into graphite, charcoal, or pyrolytic carbon powder; It is a graphite intercalation compound.

Anode: lithium

Electrolyte: **Lithium tetrafluoroborate LiBF4 in propylene carbonate, 1,2 dimethoxyethane and/or gamma-butyrolactone)**

Typcial compositon:

INGREDIENT NAME	CAS #	%	TLV*
Stainless Steel	--	70 - 80	--
Carbon Monofluoride	51311-17-2	6 - 12	3.5 mg/m^3 (Carbon Black, TWA)
Propylene Carbonate	108-32-7	2 - 6	None Established
Polypropylene	9003-07-0	2 - 6	None Established
Dimethoxyethane (1,2)	110-71-4	2 - 4	None Established
Lithium	7439-93-2	1 - 3	None Established

HAZARDOUS CHARACTERISTICS: ECOTOXIC

- **1,2-dimethoxyethane**: F flammable, T; CAS 110-71-4; Harmful by inhalation, ingestion and through skin contact; possible teratogen. May impair fertility; highly flammable; R11 R19 R20 R60 R61; Not found in EC list of hazardous chemicals

- **Carbon monofluoride:** CAS number is [51311-17-2] [1].- no entry in EC list of hazardous chemicals

- **Propylene carbonate** (carbonic acid cyclic methylethylene ester, carbonic acid propylene ester, cyclic 1,2-propylene carbonate)CAS No: 108-32-7 , EC No: 203-572-1, EC Index No: 607-194-00-1 ,Irritant. May be harmful by inhalation, ingestion or skin contact. Risk phrases - R36. (limit for irritant: 20%)

- **Lithium tetrafluoroborate,** C corrosive, R: 20/21/22-31-34, UN 3260 class 8, Water Pollution Class 3

- **γ-Butyrolactone** CAS Number 96-48-0, EG/EC Number 2025095, Xn, R:22-36

Lithium iron disulfide battery Li-FeS2

Anode: lithium foil

Cathode: iron disulfide with aluminium cathode contact

Electrolyte: **propylene carbonate, dioxolane, dimethoxyethane**

MATERIAL OR INGREDIENT	PEL (OSHA)	TLV (ACGIH)	%/wt.
Carbon Black (CAS# 1333-86-4)	3.5 mg/m³ TWA	3.5 mg/m³ TWA	0-4
1,2-Dimethoxyethane (CAS# 110-71-4)	None established	None established	2-4
1,3-Dioxolane (CAS# 646-06-0)	None established	20 ppm	5-9
Graphite (CAS# 7782-42-5)	15 mg/m³ TWA (total dust) 5 mg/m³ TWA (respirable fraction)	2 mg/m³ TWA (respirable fraction)	0-4
Iron Disulfide (CAS# 1309-36-0)	None established	None established	24-35
Lithium or Lithium Alloy (CAS# 7439-93-2)	None established	None established	5-8
Lithium Iodide (CAS# 10377-51-2)	None established	None established	0.5-3

HAZARDOUS CHARACTERISTICS: ECOTOXIC

- **1,3, dioxolane** – F flammable, CAS 646-06-0

- **1,2-dimethoxyethane**: F flammable, T; CAS 110-71-4; Harmful by inhalation, ingestion and through skin contact; possible teratogen. May impair fertility; highly flammable; R11 R19 R20 R60 R61; Not found in EC list of hazardous chemicals

- **Lithium**: flammable, corrosive R:14/15; R 34 - (5% R 34 – corrosive)
- **Lithium iodide:** Xi irritant, R 36/38

- **Iron disulfide**
  Iron compounds have varying toxicity. Acute exposure to excessive levels of ferrous compounds can cause liver and kidney damage, altered respiratory rates and convulsions (Sax, Dangerous Properties of Industrial Materials, eighth edition).

- **Acetylene black (carbon black):** CAS No: 1333-86-4, EINECS: 215-609-9, not found in EC list of hazardous chemicals; IARC evaluation: possible human carcinogen (Group 2B). May be harmful by ingestion or inhalation. Respiratory irritant

Lithium sulphur dioxide Li-SO2

service life of 15 to 20 years.

Anode : lithium

Cathode : sulfur dioxide on Teflon bonded carbon (liquid cathode)

Electrolyte: in the case of lithium-sulfur dioxide, the electrolyte is also an **organic solvent (acetonitrile)** solution with **lithium bromide and sulphur dioxide**

HAZARDOUS CHARACTERISTICS: ECOTOXIC, TOXIC

Lithium-sulfur dioxide batteries contain **pressurized sulfur dioxide** gas which vaporizes upon exposure to air, -- **highly toxic.** The batteries require safety ventilation; **acetonitrile forms cyanide** and can form **hydrogen cyanide** in high temperatures.

- **Acetonitrile:** CAS Number :75-05-8, EG/EC Number 2008352, F, Xn; R 11-20/21/22-36; UN 1648, class 3

Lithium Thionyl Chloride Cell: Li-SOCl2

Anode : lithium

Cathode : liquid mixture of a non-aqueous thionyl chloride and lithium tetrachloroaluminate acts as the cathode (liquid cathode) and the a electrolyte, respectively .A porous carbon material serves as a cathode current collector, which receives electrons from the external circuit. (use in commercial/industrial applications; low temperature applications → toxic)

HAZARDOUS CHARACTERISTICS: ECOTOXIC, CORROSIVE

- **Thionylchloride, $SOCl_2$**, CAS Number: 7719-09-7, EG/EC Number : 2317488 corrosive C, Risk: 14-20/22-29-35 , UN 1836 class 8

- **Lithium tetrachloroaluminate $AlCl_4Li$,** CAS Number 14024-11-4, Hazard Codes : C, R: 14-20/21/22-34, UN 3260 class 8

Lithium Iodine Cell

A lithium-iodine cell comprising a cathode including a charge transfer complex of an organic donor component and iodine, an anode including a lithium element having a surface operatively contacting the charge transfer complex material, and a coating on the lithium surface of an organic electron donor material, preferably but not necessarily the organic donor component of the charge transfer complex. The organic electron donor material preferably comprises polyvinyl pyridine polymer and in particular two-vinyl pyridine polymer. A solution of two-vinyl pyridine polymer in benzene is brushed onto the anode lithium surface and then exposed to a desiccant. A number of coatings preferably are applied successively to provide a resulting or finished coating of increased thickness.

Used for the majority of implanted cardiac pacemakers.

Cathode: iodine

Electrolyte: **solid organic charge transfer complex** (e.g. poly-2-vinylpyridine P2VP) (solid electrolyte)

HAZARDOUS CHARACTERISTICS: ECOTOXIC

- **Iodine :** Hazard Codes Xn, N; Risk Statements 20/21-50; UN 1759 8/PG 2, German Water Pollution Class 1
- **Details about the solid organic charge transfer complex are not known.**

4. LITHIUM ION BATTERY (RECHARGEABLE CELL (LI-ION)

Lithium-carbon battery

Cathode: carbon to which lithium cations are intercalated or deintercalated during the charge-discharge process.

A particularly important element for activating Li-ion batteries is the solid electrolyte interphase (SEI).

Liquid electrolytes: consist of solid lithium-salt electrolytes, such as LiPF6, LiBF4, or LiClO4, and organic solvents, such as ether. Lithium-ion batteries can easily rupture, ignite, or explode when exposed to high temperatures, or direct sunlight.

Typical compositions of lithium ion batteries

MATERIAL OR INGREDIENT	PEL (OSHA)	TLV (ACGIH)	%/wt.
Acetylene Black (CAS# 1333-86-4)	3.5 mg/m^3 TWA (as carbon black)	3.5 mg/m^3 TWA (as carbon black)	0-2
Biphenyl (CAS# 92-52-4)	1 mg/m^3 TWA 0.2 ppm TWA	0.2 ppm TWA	0-15
Diethyl Carbonate (CAS# 105-58-8)	None established	None established	0-15
Dimethyl Carbonate (CAS# 616-38-6)	None established	None established	0-15
Ethyl Methyl Carbonate (CAS# 623-53-0)	None established	None established	0-15
Ethylene Carbonate (CAS# 96-49-1)	None established	None established	0-15
MATERIAL OR INGREDIENT	**PEL (OSHA)**	**TLV (ACGIH)**	**%/wt.**
Graphite (CAS# 7782-42-5)	5 mg/m^3 TWA (respirable fraction) 15 mg/m^3 TWA (total dust)	2 mg/m^3 TWA (respirable fraction)	7-22
Lithium Cobalt Oxide (CAS# 12190-79-3)	0.1 mg/m^3 TWA (as Co)	0.02 mg/m^3 TWA (as Co)	15-30
Lithium Hexafluorophosphate (CAS# 21324-40-3)	None established	None established	0-5
Lithium Tetrafluoroborate (CAS# 14283-07-9)	None established	None established	0-5
n-Methyl Pyrrolidinone (CAS# 872-50-4)	None established	None established	0-1
Oxalic Acid (CAS# 144-62-7)	1 mg/m^3 TWA	1 mg/m^3 TWA 2 mg/m^3 STEL	0-1
Propylene Carbonate (CAS# 108-32-7)	None established	None established	0-15

<u>Other producer´s data:</u>

MATERIAL OR INGREDIENT	PEL (OSHA)	TLV (ACGIH)	%/wt.
Carbon Black (CAS# 1333-86-4)	3.5 mg/m^3 TWA	3.5 mg/m^3 TWA	0-1
1,2-Dimethoxyethane (CAS# 110-71-4)	None established	None established	0-6
1,3-Dioxolane (CAS# 646-06-0)	None established	None established	0-8
Graphite (CAS# 7782-42-5)	15 mg/m^3 TWA (total dust) 5 mg/m^3 TWA (respirable fraction)	2 mg/m^3 TWA (respirable fraction)	0-3
Lithium or Lithium Alloy (CAS# 7439-93-2)	None established	None established	1-6
Lithium Perchlorate (CAS# 7791-03-9)	None established	None established	0-3
MATERIAL OR INGREDIENT	**PEL (OSHA)**	**TLV (ACGIH)**	**%/wt.**
Lithium Trifluoromethanesulfonate (CAS# 33454-82-9)	None established	None established	0-3
Lithium Trifluoromethanesulfonimide (CAS# 90076-65-6)	None established	None established	0-3
Manganese Dioxide (CAS# 1313-13-9)	5 mg/m^3 Ceiling (as Mn)	0.2 mg/m^3 TWA (as Mn)	12-42
Propylene Carbonate (CAS# 108-32-7)	None established	None established	0-8

Lithium ion rechargeable battery – other producer´s data : weight %

Lithium Cobalt Oxide (12190-79-3)	30-40
Mesophase Carbon Microbeads (7440-44-0)	20-25
Copper (7440-50-8)	10-15
Ethylene Carbonate (96-49-1)	5-10
Dimethyl Carbonate (616-38-6)	5-10
Aluminum (7429-90-5)	1-5
Lithium Hexafluorophosphate (21324-40-3)	1-5
Acetylene Black (1333-86-4)	1-5

Other producer´s data

INGREDIENT NAME	CAS #	%	TLV*
Steel	7439-89-6	15-30	--
Lithium Cobalt Nickel Dioxide	12031-55-1 12031-65-1	<25	0.02 mg/m^3 (Co, TWA) 0.1 mg/m^3 (Ni, Soluble Compounds, TWA)
Lithiated Manganese Dioxide	12057-17-9	<25	0.2 mg/m^3 (Mn, TWA)
Graphite	7782-42-5	3 - 5	2 mg/m^3 (TWA)
Copper	7440-50-8	5-15	0.2mg/m^3(Fume, TWA)
Aluminum	7429-90-5	2-8	2 mg/m^3 (Soluble Salts, TWA)
Nickel	7440-02-0	2-5	1.5 mg/m^3 (Elemental, TWA)
Lithium Hexafluorophosphate	21324-40-3	1-5	2.5 mg/m^3 (F, TWA)
Ethylene Carbonate	96-49-1	<15	None Established
Methyl Ethyl Carbonate	623-53-0	<15	None Established
Dimethyl Carbonate	616-38-6	<15	None Established
Diethyl Carbonate	105-58-8	<15	None Established
Methyl Acetate	79-20-9	<15	200 ppm (TWA)
Plastic, Ceramic, Other	--	<20	--

HAZARDOUS CHARACTERISTICS: IRRITANT, ECOTOXIC

General: Contents of an open battery can cause serious chemical burns; N-methyl pyrrolidinone, ethylene carbonate, ethyl methyl carbonate, dimethyl carbonate, and biphenyl may be absorbed through the skin causing localized inflammation.

- **Manganese dioxide MnO2** EG-No: 215-202-6, CAS**:** 1313-13-9 – Xn; R20/22; harmful by inhalation or ingestion – (limit: 25 % - Xn, sum of harmful substances)

- **Biphenyl:** EC Nr 202-163-5; CAS: 92-52-4, R36/37/38-50/53, Xi, N (irritant – limit 20%) ,Water Pollution Class 2

- **N-Methyl-2-pyrrolidinone:** CAS Number 872-50-4, EG/EC Number 2128281 Hazard Codes , Xi; R 36/38

- **Ethylene carbonate: CAS 96-49-1** EG/EC Number: 2025100, Hazardous in case of skin contact (irritant). Slightly hazardous in case of ingestion, of inhalation (lung irritant). Non-hazardous in case of inhalation.Synonym : 1,3-Dioxolan-2-one; Xi – R 36/37/38

- **Propylene Carbonate** (carbonic acid cyclic methylethylene ester, carbonic acid propylene ester, cyclic 1,2-propylene carbonate)CAS No: 108-32-7 , EC No: 203-572-1, EC Index No: 607-194-00-1 Xi, Irritant. May be harmful by inhalation, ingestion or skin contact. Risk phrases - R36. (limit for irritant: 20%)

- **Dimethyl carbonate:** CAS Number 616-38-6; EG/EC Number 2104784
  Hazard Codes F;flammable, Water Pollution Class Germany 1

- **Acetylene black and cobalt compounds are listed as possible carcinogens** by the International Agency for Research on Cancer (IARC).

- **Lithium tetrafluoroborate LiBF4**
  CAS No: 14283-07-9, EC No: 238-178-9, corrosive - causes burns. Harmful, if swallowed or inhaled, and in contact with skin. Very destructive of mucous membranes. Toxicology not fully investigated. R20 R21 R22 R31 R34. UN No 3260. Packing group II. Major hazard class 8

- **Lithium hexafluorophosphate** : LiPF6 , CAS No: 21324-40-3, Harmful if swallowed, inhaled or absorbed through the skin. Very destructive of mucous membranes – C, corrosive; R20 R21 R22 R34. UN No 3260 - class 8

- **Lithium trifluoromethanesulfonate,** CAS no: 33454-82-9, Xi , irritant, R 36/37/38 Irritating to eyes, respiratory system and skin.

- **Lithium cobalte oxide** CAS-Nr. 12190-79-3, EINECS-Nr. 235-362-0: Xn; R: 42/43

- **Lithium perchlorate** LiClO4 : CAS No: 7791-03-9, strong oxidizer - contact with combustible material may cause fire. Incompatible with organic materials, combustible materials, strong reducing agents. Skin, eye and respiratory irritant. – R36 R37 R38

Lithium Polymer battery

The lithium-polymer battery differs from other battery systems in the type of electrolyte used. The polymer electrolyte replaces the traditional porous separator, which is soaked with electrolytes The dry polymer design offers simplifications with respect to fabrication, safety, there is no danger of flammability, because no liquid or gelled electrolyte is used.

Common chemical name / General name	CAS number	Concentration / Concentration range	Classification and hazard labeling
Lithium Cobaltate (LiCoO2)	12190-79-3	10-20%	-
Lithium Manganate (LiMn2O4)	12057-17-9	10-20%	-
Aluminum	7429-90-5	10-40%	-
Graphite (Natural graphite) (Artificial graphite)	7782-42-5 7740-44-0	10-20%	-
Copper	7440-50-8	5-10%	Sensitization of the skin group No.2
Polymer electrolyte	-	5-20%	Inflammable Solid

Other producer lithium polymer battery

Hazardous Components	Contents,%	CAS No.
Aluminum Foil	**3-12**	**7429-90-5**
Transition Metal Oxide	**20-50**	**-**
Carbon(Graphite, Proprietary)	**15-35**	**7440-44-0**
PVDF(Poly Vinylidene Fluoride)	**<8**	**24937-79-9**
Copper Foil	**3-12**	**7440-50-8**
Electrolyte (Proprietary)	**10-20**	**-**
Al Film Cover	Remainder	**N/A**

Other producer lithium polymer battery

Chemical Name	CAS No.	Percentage %
Lithium Cobalt Oxide	12190-79-3	25 – 30
Carbon	7440-44-0	10 – 15
Polymer		5 – 15
Copper	7440-50-8	7 – 11
Aluminum	7429-90-5	8 - 12
Other	N/A	27- 46

HAZARDOUS CHARACTERISTICS: HARMFUL, ECOTOXIC

General : The steam of the electrolyte has an anesthesia action and stimulates a respiratory tract.The electrolyte skin contact causes a sore and the stimulation on the skin. If the electrolyte contacts with water, it may generate detrimental hydrogen fluoride. The leaked electrolyte is inflammable liquid

- **Lithium manganate:** Water Pollution Class 3

- **Lithium cobalte oxide** CAS-Nr. 12190-79-3, Xn; R: 42/43
  Lithium hydroxide R: 22-35; C- corrosive
- **Lithium cobalte oxide** CAS-Nr. 12190-79-3, Xn; R: 42/43
- **Polymer electrolyte** – flammable liquid

- **$(CH_2CF_2)_n$Poly(vinylidene fluoride)** CAS Number 24937-79-9., EG/EC Number : 2008677, Water Pollution Class 3

Lithium - Cobalt oxide battery (rechargeable)

The lithium/cobalt oxide cathode battery ($LiCoO_2$) is very light and has an energy density about three times higher than that of the conventional rechargeable batteries (for portable or mobile IT instruments)

Positive electrode; Lithium cobalt oxide 20 - 35wt%

Negative electrode; Carbon 5 - 20wt%

Electrolyte; Organic electrolyte mainly composed of **alkyl carbonate 10 - 20wt%**

HAZARDOUS CHARACTERISTICS: HARMFUL, ECOTOXIC

- **Lithium cobalte oxide** CAS-Nr. 12190-79-3,Hazard Codes : Xn; R: 42/43
- **alkyl carbonate** – irritant or flammable

Lithium - Nickel oxide battery

The lithium / nickel oxide positive electrode ($LiNiO_2$), has a capacity almost 40% over currently mass-produced batteries.

HAZARDOUS CHARACTERISTICS: HARMFUL, ECOTOXIC - Nickel salts – carcinogenic

Lithium - Vanadium battery (rechargeable)

Vanadium pentoxide (Li/V_2O_5) is a solid cathode material into which lithium ions are inserted. The system is low pressure, so low rate cells do not need to have a safety vent. Vanadium pentoxide is mainly used in reserve batteries but it is likely to be of more importance in rechargeable lithium batteries in the future.

Chemistry	Cathode	Electrolyte	Application
$Li\text{-}Ag_2V_4O_{11}$, Li-SVO, Li-CSVO	Silver oxide+vanadium pentoxide (SVO)	lithium hexafluorophosphate or lithium hexafluoroarsenate in propylene carbonate with dimethoxyethane	Used in medical applications, eg. implantable defibrillators, neurostimulators. Also projected for use in other electronics, eg. emergency locator transmitters. Addition of copper oxide to the cathode material results in the Li-CSVO variant.

HAZARDOUS CHARACTERISTICS: HARMFUL, ECOTOXIC

- **Vanadium pentoxide: V_2O_5** CAS Number 1314-62-1, EG/EC Number 2152398, T, N, : 20/22-37-48/23-51/53-63-68, UN 2862 class 6.1, Water Pollution Class 3

- **Lithium hexafluorophosphate** : $LiPF_6$, CAS No: 21324-40-3, Harmful if swallowed, inhaled or absorbed through the skin. Very destructive of mucous membranes -corrosive ; R20 R21 R22 R34 UN No 3260, class 8.

- **1,2-dimethoxyethane:** F, flammable, CAS11071- 4; R11 Harmful by inhalation, ingestion and through skin contact. Possible teratogen. May impair fertility; highly flammable; R11 R19 R20 R60 R61; not found in EC list of hazardous chemicals

- **Propylene carbonate** (carbonic acid cyclic methylethylene ester, carbonic acid propylene ester, cyclic 1,2-propylene carbonate)CAS No: 108-32-7 , EC No: 203-572-1, EC Index No: 607-194-00-1 Xi ,Irritant. May be harmful by inhalation, ingestion or skin contact. Risk phrases - R36. (limit for irritant: 20%)

Chemistry	Cathode	Electrolyte	Notes
Li-Ag_2CrO_4	Silver chromate	Lithium perchlorate solution	Very high reliability. Has a 2.6V plateau after reaching certain percentage of discharge, provides early warning of impending discharge. Developed specifically for medical applications, eg. implanted pacemakers.

HAZARDOUS CHARACTERISTICS: TOXIC, ECOTOXIC

- **Silver chromate:** Ag_2CrO_4, CAS Number 7784-01-2, EG/EC Number 2320438, Hazard Codes O,T,N, R 49-8-43-50/53, Water Pollution Class 3

- **Lithium perchlorate** LiClO4 : CAS No: 7791-03-9, strong oxidizer - contact with combustible material may cause fire. Incompatible with organic materials, combustible materials, strong reducing agents. Skin, eye and respiratory irritant. – R36 R37 R38.

5. NICKEL BATTERIES

Nickel-iron battery

Cathode: Nickel(III) oxide-hydroxide (main component)
Anode: iron
Electrolyte: **potassium hydroxide**

HAZARDOUS CHARACTERISTICS: CORROSIVE , ECOTOXIC

- **Ni-dioxide, Dinickeltrioxide** carc. cat 1 – 0,1% limit and **Nickel oxides** – carc. Cat 3, Xn
- **Potassium hydroxide: EC-No: 215-181-3, CAS: 1310-58-3** harmful, corrosive R22-35; (corrosive : limit 1% of corrosive R34, 5 % of R35)
- 5%<c<25% - C (corrosive), R35
- 2%<c<5% - C (corrosive), R34
- 0,5%<c<2% ; Xi (irritant) R36/38
-

Nickel-Hydrogen Batteries

Cathode: nickel oxide

Anode: hydrogen - hydrogen electrodes utilize a teflon-bonded platinum black catalyst

Hydrogen gas in the negative electrode becomes oxidized to water at discharge, only to be reformed at charge via electrolysis. Oxygen is formed at the positive electrode at overcharge, and there is no alteration of the potassium hydroxide (KOH) or water level in the battery during continuous overcharge. The positive electrode makes hydrogen during reversal, which in turn is consumed at the same rate at the negative electrode. In addition, hydrogen reacts electrochemically but not chemically, and reduces the nickel oxyhydroxide.

The sintered positive electrode is made up of a sintered porous nickel plaque, which contains active material of nickel hydroxide. The plaque conducts the battery's electric current, and retains the active material. The battery can use two types of separators in aerospace cells: fuel-grade cell asbestos paper (old cells) and untreated knit Zircar cloth.

Nickel metal hydride battery

Chemical Name	CAS No.	Percentage %
Nickel	7440-02-0	30 – 40
Cobalt	7440-48-4	4 – 8
Manganese	7439-96-5	<2
Potassium Hydroxide	1310-58-3	10 – 15
Sodium Hydroxide	1310-73-2	4
Lithium Hydroxide	1310-65-2	0 – 4
Other	N/A	<13

MATERIAL OR INGREDIENT	PEL (OSHA)	TLV (ACGIH)	%/wt.
Aluminum (CAS# 7429-90-5)	15 mg/m^3 TWA (total dust) 5 mg/m^3 TWA (respirable fraction)	10 mg/m^3 TWA	< 2
Cobalt as cobalt metal (CAS# 7440-48-4) as cobalt oxide (CAS# 1307-96-6) as cobalt hydroxide (CAS# 21041-93-0)	0.1 mg/m^3 TWA (as Co)	0.02 mg/m^3 TWA (as Co)	2.5-6.0
Lithium Hydroxide (CAS# 1310-65-2)	None established	None established	0-4
MATERIAL OR INGREDIENT	**PEL (OSHA)**	**TLV (ACGIH)**	**%/wt.**
Manganese (CAS# 7439-96-5)	5 mg/m^3 Ceiling	0.2 mg/m^3 TWA (as Mn)	< 3
Mischmetal including: Lanthanum (CAS# 7439-91-0) Cerium (CAS# 7440-45-1) Neodymium (CAS# 7440-00-8) Praseodymium (CAS# 7440-10-0)	15 mg/m^3 TWA (particulates not otherwise regulated-total dust) 5 mg/m^3 TWA (particulates not otherwise regulated-respirable fraction)	10 mg/m^3 TWA (particulates not otherwise classified-inhalable) 3 mg/m^3 TWA (particulates not otherwise classified-respirable)	< 13
Nickel as nickel hydroxide (CAS# 12054-48-7) as nickel oxide (CAS# 1313-99-1) as nickel powder (CAS# 7440-02-0)	1 mg/m^3 TWA (as Ni)	1.5 mg/m^3 TWA (as inhalable Ni) 0.2 mg/m^3 TWA (as inhalable Ni, insoluble compounds) [changed 3 format to be consistent with rest of the numbers]	30-50
Potassium Hydroxide (CAS# 1310-58-3)	None established	2 mg/m^3 Ceiling	< 7
Sodium Hydroxide (CAS# 1310-73-2)	2 mg/m^3 TWA	2 mg/m^3 Ceiling	0-4
Zinc as zinc metal (CAS# 7440-66-6) as zinc oxide (CAS# 1314-13-2) as zinc hydroxide (CAS# 20427-58-1)	15 mg/m^3 TWA (total dust: zinc oxide) 5 mg/m^3 TWA (respirable fraction: zinc oxide)	10 mg/m^3 TWA (total dust: zinc oxide)	< 3

<u>HAZARDOUS CHARACTERISTICS: CORROSIVE, CARCINOGENIC, ECOTOXIC</u>

- **Ni-dioxide, Dinickeltrioxide** carc. cat 1 – 0,1% limit
- **Nickel oxide and nickel powder** – carc Cat 3 , Xn
-

- **Potassium hydroxide:** EC-No: 215-181-3, CAS: 1310-58-3 harmful, corrosive R22-35; (corrosive : limit 1% of corrosive R34, 5 % of R35)
  - 5%<c<25% - C (corrosive), R35
  - 2%<c<5% - C (corrosive), R34
  - 0,5%<c<2% ; Xi (irritant) R36/38

- **Sodium hydroxide -**No: 215-185-5, CAS: 1310-73-2**,** (corrosive : limit 1% of corrosive R34, 5 % of R35)
  - 5%<c<100% - C (corrosive) , R35
  - 2%>c>5% - C (corrosive), R34
  - 0,5%<c<2% - Xi (irritant), R36/38

- **LiOH lithium hydroxide** CAS Number 1310-65-2, C; R: 22-35; UN 2680 class 8, Water Pollution Class 2

- **Zinc oxide :** CAS 1314-13-2, ECNo: 215-222-5; R50/53 – N (Ecotoxic)
- **Zinc hydroxide** CAS No: 20427-58-1 - No toxicological data available
- **Zinc** (powder stabilized) CAS: 7440-66-6; EC No: 231-175-3; R59/53; N (Ecotoxic)

Nickel zinc battery

Cathode: nickel (nickel oxihydroxide) electrode (pocket plate electrode, the sintered-nickel electrode, the non-sintered nickel electrode)

Anode: zinc electrode built using zinc oxide, additives, and a plastic binder

These types of electrodes are built by loading nickel hydroxide hydrate, which is the active material, and a conductive additive like graphite or nickel flakes into flat tube pockets, which are eventually made into electrodes. The sintered-nickel electrode is made by sintering high bulk density carbonyl nickel powder, thus transforming it into a porous plaque. Non-sintered nickel electrodes reduce the amount of nickel used.

Electrolyte: is usually a **potassium hydroxide**, though some use lithium hydroxide as additive material to improve semiconductive properties.

Description:		Approximate % of total weight	
Lead	:	0.004	Wt%
Mercury	:	0.0001	Wt%
Cadmium	:	0.0003	Wt%
Manganese Dioxide	:	15	Wt%
NiOOH	:	23	Wt%
Potassium hydroxide	:	6	Wt%
Zinc Power	:	18	Wt%

HAZARDOUS CHARACTERISTICS: CORROSIVE, CARCINOGENIC, ECOTOXIC

- **Potassium hydroxide:** EC-No: 215-181-3, CAS: 1310-58-3 harmful, corrosive R22-35; (corrosive : limit 1% of corrosive R34, 5 % of R35)
  - **5%<c<25% - C (corrosive), R35**
  - **2%<c<5% - C (corrosive), R34**
  - 0,5%<c<2% ; Xi (irritant) R36/38

- **Manganese Dioxide,** EG-No: 215-202-6, CAS: 1313-13-9 – Xn; R20/22; harmful by inhalation or ingestion – (limit: 25 % - Xn, sum of harmful substances)

- **Nickel (II) hydroxide, nickelous hydroxide,** $Ni(OH)_2$ CAS No: 12054-48-7 Poison. May act as a carcinogen. Harmful if swallowed, inhaled or absorbed through the skin. May act as a sensitizer. Skin, eye and respiratory irritant. R20 R21 R22 R43 R49.
- **Ni-dioxide, Dinickeltrioxide** carc. cat 1 – 0,1% limit
- **Nickel oxide and nickel powder** – carc Cat 3 , Xn

6. AMMONIA BATTERIES

Use of the **magnesium/meta-dinitrobenzene (Mg/m-DNB)** system.

Anode: consists of magnesium

Cathode: uses a meta-dinitrobenzene active ingredient,

Electrolyte salt system: ammonium thicyanate (NH4SCN) and potassium thicyanate (KSCN).

The dry salts are kept in the electrode stack. KSCN, a neutral salt, is positioned in the separator. The cathode itself consists of pads that press paper pulp, carbon, m-DNB, and NH4SCN together. NH4SCN ensures ionic conductivity and provides an acid environment to enhance anode activity, as well as reducing the ammonia's vapor pressure.

In this design, dry electrolyte salts separate the electrodes, and the ammonia vapor in the electrode compartment activates the battery.. Ammonia batteries operate anywhere between -55 and 74 degrees Celsius due to the high conductivity of ammonia electrolytes. Because of excessive internal pressure, ammonia batteries require hermetic seals.

HAZARDOUS CHARACTERISTICS: IRRITANT, ECOTOXIC

- **Ammonium thiocyanate** (rhodanide), CAS No: 1762-95-4
  Harmful if swallowed, inhaled or absorbed through the skin. Eye, skin and respiratory irritant. R20 R21 R22 R37 R37 R38.
- **Potassium thiocyanate**, CAS No: 333-20-0, Harmful if swallowed. Irritant. Skin contact may lead to ulceration, discolouration or eczema, R22 R36 R37 R38.

- **1,3-dinitrobenzol,** CAS No: 99-65-0, EC No: 202-776-8
  extremely toxic - may be fatal if swallowed, inhaled or absorbed through the skin. May cause reproductive disorders. Possible mutagen. Rapidly absorbed through the skin. Severe irritant – 0,1% limit; R26 R27 R28 R33 R50 R53. Very toxic to aquatic organisms - may cause long-term harm in the environment.

7. REDOX BATTERY

The vanadium redox battery stores energy in a liquid **electrolyte solution of vanadium pentoxide dissolved in sulphuric acid.** The electrolyte can be charged or discharged by pumping it through the battery stack and either supplying electric power to the stack or taking power from the stack. It can also be recharged by having the spent electrolyte pumped out and a fresh charge of electrolyte pumped in. The spent electrolyte can then be recharged in another battery with electricity from the mains or from renewable energy sources. This raises the opportunity for the establishment of refuelling stations so that electric vehicles could exchange their electrolyte and then continue on their way with no more delay than if refuelling with petrol or diesel.

The Vanadium Redox Flow Battery employs the V(V)/V(IV) and V(III)/V(II) redox couples in sulphuric acid as the positive and negative half-cell electrolytes respectively.

Typically, the electrolyte for the vanadium battery is 2 M **vanadium sulphate in 2.5 M H_2SO_4,** the vanadium sulphate (initially 1 M V (III) + 1 M V (IV)) being prepared by chemical reduction or electrolytic dissolution of V_2O_5 powder.

HAZARDOUS CHARACTERISTICS: CORROSIVE, ECOTOXIC

- **Sulfuric acid:** CAS 7664-93-9; EC: 231-639-5; R 35 C, corrosive
  15% >c<100% C, R35; 5%<C>15% - Xi, R 36/38
- **Vanadium(IV) sulfate** toxic; skin, eye and respiratory irritant

8 . THERMAL BATTERIES

Almost exclusively military applications.

Anode: calcium

Cathode: calcium chromate

Electrolyte: **solid lithium chloride and potassium chloride** electrolyte which are strong oxidizers or caustics capable of causing skin irritation. These batteries also contained asbestos in former times. If batteries show signs of leakage, proper eye and skin protection is recommended during handling.

Molten salt batteries are a class of primary cell and secondary cell high temperature electric battery that use molten salts as an electrolyte..Operating temperatures of 400 to 700°C however brings problems of thermal management and safety .

Referred to as thermal batteries the electrolyte is solid and inactive at normal ambient temperatures..The battery is only activated when it is actually needed by introducing the electrolyte into the active cell area and elevated to high temperatures by the application of heat from an external source, generally a pyrotechnic charge. This is achieved by burning electrically fired pellets of gas-less thermite. Older batteries used calcium or magnesium anodes, but lithium anodes are now common. Typical chemistry is lithium iron disulphide. The electrolyte is normally a eutectic mixture of lithium and potassium chlorides.

HAZARDOUS CHARACTERISTICS: ECOTOXIC

- **Calcium chromate,** CAS 13765-19-0 Calcium chromate (VI): skin and eye irritant; calcium chromate is considered a human carcinogen. Large doses of chromates can cause kidney damage, water insoluble hexavalent chromium compound;

- **Lithium chloride ,** CAS Number 7447-41-8, EG/EC Number 2312123 Xn, R: 22-36/37/38, Water Pollution Class 1

-

Sodium-Sulfur battery

A **sodium-sulfur battery** is a type of battery constructed from sodium (Na) and sulfur (S). The operating temperature of 300 to 350 °C and the highly corrosive nature of sodium make it suitable only for large-scale non-mobile applications.

The entire cell is enclosed by an inert metal container and sealed at the top with an airtight alumina lid..During the discharge phase, molten metallic sodium at the core acts as the anode, separated by a beta-alumina solid electrolyte (BASE) cylinder from a sulfur container made from an inert metal acting as the cathode. The sulfur is absorbed in a carbon sponge. Alumina is a good conductor of sodium ions but a bad conductor of electrons, avoiding self-discharge. When sodium gives off an electron, the Na^+ ion migrates to the sulfur container. The electron travels through the molten sodium to the contact and through the electric load to the sulfur container. Here, the electron reacts with sulfur to form S^-, which then forms sodium polysulfide. As the cell discharges the sodium level drops. During the charging phase the reverse process takes place. Once running, the heat produced by charging and discharging cycles is enough to maintain operating temperatures and no external source is required.

Pure sodium presents dangers because it spontaneously burns on contact with water. Therefore, the system must be protected from moisture. In modern NaS cells, sealing techniques make fires unlikely.

HAZARDOUS CHARACTERISTICS: ECOTOXIC; FLAMMABLE, CORRSOSIVE

- **Sodium metal** is highly reactive. It is flammable in a normal atmosphere, corrosive, and exothermically reactive with water, releasing hydrogen gas that is ignited by the heat of the reaction. It presents internal and external health hazards, including the risk of burns and irritation to the mucous membranes and respiratory tract. Sodium fires burn violently and may be accompanied by explosions that splatter the molten metal. **Sodium, Na:** CAS Number 7440-23-5, EG/EC Number 2311329, risks: flammable and corrosive F,C, R14/15-34, UN 1428 class 4.3, Water Pollution Class 1

Sodium-Nickelchloride battery

The **zebra (Zeolite Battery Research Africa Project) battery**, which operates at 250°C, utilizes molten sodium chloroaluminate, ($NaAlCl_4$) which has a melting point of approximately 160°C, as the electrolyte.

Negative electrode: molten sodium.

Positive electrode: nickel in the discharged state and nickel chloride in the charged state.

Because nickel and nickel chloride are nearly insoluble in neutral and basic melts, intimate contact is allowed, providing little resistance to charge transfer. Since both **$NaAlCl_4$ and Na are liquid** at the operating temperature, a sodium-conducting beta-alumina ceramic is used to separate the liquid sodium from the molten $NaAlCl_4$.

HAZARDOUS CHARACTERISTICS: ECOTOXIC, FLAMMABLE, TOXIC

- **Nickel metal and nickel chloride** are considered hazardous; **Nickel** (7718-54-9), carcinogenic – category 1, investigated as a tumorigen, mutagen, reproductive effector.

- **Sodium-Alumina Ceramic Electrolyte**
- Sodium -alumina (Na1.7Li0.3Al10.7O17) is incombustible, non-reactive, and is not known to present any health hazards beyond irritation to the eyes and respiratory system upon exposure to high concentrations of dust

- **Sodium metal** is highly reactive. It is flammable in a normal atmosphere, corrosive, and exothermically reactive with water, releasing hydrogen gas that is ignited by the heat of the reaction. It presents internal and external health hazards, including the risk of burns and irritation to the mucous membranes and respiratory tract. Sodium fires burn violently and may be accompanied by explosions that splatter the molten metal. **Sodium, Na:** CAS Number 7440-23-5, EG/EC Number 2311329, risks: flammable and corrosive F,C, R14/15-34, UN 1428 class 4.3, Water Pollution Class 1

- **Additives : Sodium fluoride** can irritate tissue if inhaled or ingested. NaF, CAS Number 7681-49-4, EG/EC Number 2316678 , toxic T R: 25-32-36/38, UN 1690 class 6.1, Water Pollution Class

9. FLOW BATTERIES

Zinc bromide battery

Flow batteries are a special class of battery where additional quantities of electrolyte are stored outside the main power cell of the battery, and circulated through it by pumps or by movement. (marine applications, gaining popularity in grid energy storage applications).

A solution of **zinc bromide** is stored in two tanks. When the battery is charged or discharged the solutions (electrolytes) are pumped through a reactor and back into the tanks. One tank is used to store the electrolyte for the positive electrode reactions and the other for the negative.

The electrolyte also contains a **bromine complexing agent (quaternary ammonium salt – NR4-Br ; R= a morpholinederivate)** that immediately reacts with the produced bromine

HAZARDOUS CHARACTERISTICS: at least ECOTOXIC, IRRITANT

- **Zinc bromide** CAS No: 7699-45-8 , EINECS No: 231-718-4 Corrosive and exotoxic, C, N- causes burns. harmful if swallowed. Respiratory, eye and skin irritant. R: R22, R34, R36 R37 R38, R50/53. **R** 34 – 5% limit for corrosive; UN 3260 class 8, Water pollution class 3

17 Overview of impact categories

Impact category	Details of the category	Priority impact category regarding Link LoW - CLP	Priority impact category regarding Entries and structure of the LoW
Economic impacts			
Competitiveness, trade and investment flows	Does the option have an impact on the competitive position of EU firms in comparison with their non-EU rivals? Does it provoke cross-border investment flows (including relocation of economic activity)? Are the proposed actions necessary to correct undesirable outcomes of market processes in European markets?	✓	✓
Competition in the internal market	Does the option affect EU competition policy and the functioning of the internal market? For example, will it lead to a reduction in consumer choice, higher prices due to less competition, the creation of barriers for new suppliers and service providers, the facilitation of anti-competitive behaviour or emergence of monopolies, market segmentation, etc?		
Operating costs and conduct of business	Will it impose additional adjustment, compliance or transaction costs on businesses? Does the option affect the cost or availability of essential inputs (raw materials, machinery, labour, energy, etc.)? Does it affect access to finance? Does it impact on the investment cycle? Will it entail the withdrawal of certain products from the market? Is the marketing of products limited or prohibited? Will it entail stricter regulation of the conduct of a particular business? Will it directly lead to the closing down of businesses? Are some products or businesses treated differently from others in a comparable situation?	✓	✓
Administrative costs on businesses	Does the option impose additional administrative requirements on businesses or increase administrative complexity? Do these costs weigh in relative terms heavily on SMEs?	✓	✓
Property rights	Are property rights affected (land, movable property, tangible/intangible assets)? Is acquisition, sale or use of property rights limited? Or will there be a complete loss of property?		
Innovation and research	Does the option stimulate or hinder research and development? Does it facilitate the introduction and dissemination of new production methods, technologies and products? Does it affect intellectual property rights (patents, trademarks, copyright, other know-how rights)? Does it promote or limit academic or industrial research? Does it promote greater resource efficiency?		
Consumers and households	Does the option affect the prices consumers pay? Does it impact on consumers' ability to benefit from the internal market? Does it have an impact on the quality and availability of the goods/services they buy, and on consumer choice? Does it affect consumer information and protection? Does it have significant consequences for the financial situation of individuals / households, both immediately and in the long run? Does it affect the economic protection of the family and of children?		
Specific regions or sectors	Does the option have significant effects on certain sectors? Will it have a specific impact on certain regions, for instance in terms of jobs created or lost? Does it have specific consequences for SMEs?		
Third countries and international relations	Does the option affect EU trade policy and its international obligations, including in the WTO? Does it affect EU foreign policy and EU/EC development policy? Does the option affect third countries with which the EU has preferential trade arrangements? Does the option affect developing, least developed and middle income countries?		
Public authorities	Does the option have budgetary consequences for public authorities at different levels of government, both immediately and in the long run?	✓	✓

Impact category	Details of the category	Priority impact category regarding Link LoW - CLP	Priority impact category regarding Entries and structure of the LoW
	Does the option require significant establishing new or restructuring existing public authorities?		
The macroeconomic environment	What are the overall consequences of the option for economic growth and employment? Does it contribute to improving the conditions for investment and for the proper functioning of markets? Does the option have direct or indirect inflationary consequences?		
Environmental impacts			
Air quality	Does the option have an effect on emissions of acidifying, eutrophying, photochemical or harmful air pollutants that might affect human health, damage crops or buildings or lead to deterioration in the environment (polluted soil or rivers etc)?	✓	✓
Water quality and resources	Does the option decrease or increase the quality or quantity of freshwater and groundwater? Does it raise or lower the quality of waters in coastal and marine areas (e.g. through discharges of sewage, nutrients, oil, heavy metals, and other pollutants)? Does it affect drinking water resources?	✓	✓
Soil quality or resources	Does the option affect the acidification, contamination or salinity of soil, and soil erosion rates? Does it lead to loss of available soil (e.g. through building or construction works) or increase the amount of usable soil (e.g. through land decontamination)?	✓	✓
The climate	Does the option affect the emission of ozone-depleting substances (CFCs, HCFCs, etc.) and greenhouse gases (e.g. carbon dioxide, methane etc) into the atmosphere?		
Renewable or non-renewable resources	Does the option affect the use of renewable resources (freshwater, fish) more quickly than they can regenerate? Does it reduce or increase use of non-renewable resources (groundwater, minerals etc)?		
Biodiversity, flora, fauna and landscapes	Does the option reduce the number of species/varieties/races in any area (i.e. reduce biological diversity) or increase the range of species (e.g. by promoting conservation)? Does it affect protected or endangered species or their habitats or ecologically sensitive areas? Does it split the landscape into smaller areas or in other ways affect migration routes, ecological corridors or buffer zones? Does the option affect the scenic value of protected landscape?		
Land use	Does the option have the effect of bringing new areas of land ('greenfields') into use for the first time? Does it affect land designated as sensitive for ecological reasons? Does it lead to a change in land use (for example, the divide between rural and urban, or change in type of agriculture)?		
Waste production / generation /recycling	Does the option affect waste production (solid, urban, agricultural, industrial, mining, radioactive or toxic waste) or how waste is treated, disposed of or recycled?	✓	✓
The likelihood or scale of environmental risks	Does the option affect the likelihood or prevention of fire, explosions, breakdowns, accidents and accidental emissions? Does it affect the risk of unauthorised or unintentional dissemination of environmentally alien or genetically modified organisms? Does it increase or decrease the likelihood of natural disasters?		
Mobility (transport modes) and the use of energy	Does the option increase or decrease consumption of energy and production of heat? Will it increase or decrease the demand for transport (passenger or freight), or influence its modal split? Does it increase or decrease vehicle emissions?		
The environmental consequences of firms' activities	Does the option lead to changes in natural resource inputs required per output? Will it lead to production becoming more or less energy intensive? Does the option make environmentally un/friendly goods and services cheaper or more expensive through changes in taxation, certification, product, design rules, procurement rules etc.? Does the option promote or restrict environmentally un/friendly goods and services through		

Impact category	Details of the category	Priority impact category regarding	
		Link LoW - CLP	Entries and structure of the LoW
	changes in the rules on capital investments, loans, insurance services etc? Will it lead to businesses becoming more or less polluting through changes in the way in which they operate?		
Animal and plant health, food and feed safety	Does the option have an impact on health of animals and plants? Does the option affect animal welfare (i.e. humane treatment of animals)? Does the option affect the safety of food and feed?		
Social Impacts			
Employment and labour markets	Does the option facilitate new job creation? Does it lead directly to a loss of jobs? Does it have specific negative consequences for particular professions, groups of workers, or self-employed persons? Does it affect the demand for labour? Does it have an impact on the functioning of the labour market?		
Standards and rights related to job quality	Does the option impact on job quality? Does the option affect the access of workers or job-seekers to vocational or continuous training? Will it affect workers' health, safety and dignity? Does the option directly or indirectly affect workers' existing rights and obligations, in particular as regards information and consultation within their undertaking and protection against dismissal? Does it affect the protection of young people at work? Does it directly or indirectly affect employers' existing rights and obligations? Does it bring about minimum employment standards across the EU? Does the option facilitate or restrict restructuring, adaptation to change and the use of technological innovations in the workplace?		
Social inclusion and protection of particular groups	Does the option affect access to the labour market or transitions into/out of the labour market? Does it lead directly or indirectly to greater in/equality? Does it affect equal access to services and goods? Does it affect access to placement services or to services of general economic interest? Does the option make the public better informed about a particular issue? Does the option affect specific groups of individuals, firms, localities, the most vulnerable, the most at risk of poverty, more than others? Does the option significantly affect third country nationals, children, women, disabled people, the unemployed, the elderly, political parties or civic organisations, churches, religious and non-confessional organisations, or ethnic, linguistic and religious minorities, asylum seekers?		
Equality of treatment and opportunities, non-discrimination	Does the option affect equal treatment and equal opportunities for all? Does the option affect gender equality? Does the option entail any different treatment of groups or individuals directly on grounds of e.g. gender, race, colour, ethnic or social origin, genetic features, language, religion or belief, political or any other opinion, membership of a national minority, property, birth, disability, age or sexual orientation? Or could it lead to indirect discrimination?		
Private and family life, personal data	Does the option affect the privacy of individuals (including their home and communications) or their right to move freely within the EU? Does it affect family life or the legal, economic or social protection of the family? Does the option involve the processing of personal data or the concerned individual's right of access to personal data?		
Governance, participation, good administration, access to justice, media and ethics	Does the option affect the involvement of stakeholders in issues of governance as provided for in the Treaty and the new governance approach? Are all actors and stakeholders treated on an equal footing, with due respect for their diversity? Does the option impact on cultural and linguistic diversity? Does it affect the autonomy of the social partners in the areas for which		

Impact category	Details of the category	Priority impact category regarding	
		Link LoW - CLP	Entries and structure of the LoW
	they are competent? Does it, for example, affect the right of collective bargaining at any level or the right to take collective action? Does the implementation of the proposed measures affect public institutions and administrations, for example in regard to their responsibilities? Will the option affect the individual's rights and relations with the public administration? Does it affect the individual's access to justice? Does the option make the public better informed about a particular issue? Does it affect the public's access to information? Does the option affect the media, media pluralism and freedom of expression? Does the option raise (bio)ethical issues (cloning, use of human body or its parts for financial gain, genetic research/testing; use of genetic information)?		
Public health and safety	Does the option affect the health and safety of individuals/populations, including life expectancy, mortality and morbidity, through impacts on the socio-economic environment (e.g. working environment, income, education, occupation, nutrition)? Does the option increase or decrease the likelihood of bioterrorism? Does the option increase or decrease the likelihood of health risks due to substances harmful to the natural environment? Does it affect health due to changes in the amount of noise or air, water or soil quality in populated areas? Will it affect health due to changes energy use and/or waste disposal? Does the option affect lifestyle-related determinants of health such as use of tobacco, alcohol, or physical activity? Are there specific effects on particular risk groups (determined by age, gender, disability, social group, mobility, region, etc.)?	✓	✓
Crime, terrorism and security	Does the option improve or hinder security, crime or terrorism? Does the option affect the criminal's chances of detection or his/her potential gain from the crime? Is the option likely to increase the number of criminal acts? Does it affect law enforcement capacity? Will it have an impact on the balance between security interests and the rights of suspects? Does it affect the rights of victims of crime and witnesses?		
Access to and effects on social protection, health and educational systems	Does the option have an impact on services in terms of their quality and access to them? Does it have an effect on the education and mobility of workers (health, education, etc.)? Does the option affect the access of individuals to public/private education or vocational and continuing training? Does it affect the cross-border provision of services, referrals across borders and co-operation in border regions? Does the option affect the financing / organisation / access to social, health and education systems (including vocational training)? Does it affect universities and academic freedom / self-governance?		

18 Interim Hazardous Waste list (Sweden)

In order to reduce testing efforts Sweden developed an "Interim Hazardous Waste list" which lists mirror wastes where it can be assumed that they are in most cases hazardous wastes. A waste which is on this list can be characterised as non-hazardous waste when testing shows that it does not show hazardous characteristics.

Waste classified as hazardous until the opposite is proved [referring to waste with mirror entries in the waste list]

1. Antifreeze fluids in cases when contents of ethylene glycol can not be excluded [16 01 14*].
2. Fluff-light fraction and dust from shredding of end-of-life vehicles or discarded electrical and electronic equipment [19 10 03*].
3. Treated / impregnated wood [for example 03 01 04*, 17 02 04*, 19 12 06*, 20 01 37*]
4. Fly ash from waste incineration [19 01 13*].
5. Construction and demolition wastes which presumably may contain coal tar (for example "tar paper" used as wind shielding wall-/roof lining, tar containing joint sealants, wear resistance layers and moist barriers in roofs, floors, foundations and bathrooms) [for example 17 01 06*, 17 06 03*, 17 09 03*].
6. Bituminous mixtures containing coal tar [17 03 01*]. If, however, the contents of USEPA 16 PAH are less than 300 ppm or the contents of USEPA 7 PAH are less than 100 ppm, then the waste normally may be classified as non-hazardous [the carcinogenic property of the waste is presumed to be more determining for the classification than the ecotoxic property]. USEPA 16 PAH includes: Acenaphthene, Acenaphthylene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene, Fluorene, Indeno(1,2,3-cd)pyrene, Naphthalene, Phenanthrene and Pyrene. USEPA 7 PAH includes: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fl uoranthene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene, and Indeno(1,2,3-cd)pyrene. (ppm = parts per million)
7. Casting cores and moulds containing phenols (resols) as a binder [10 09 05*, 10 09 07*, 10 10 05*, 10 10 07*].
8. Waste blasting materials from blasting of surfaces coated with lead containing pigments (for example red-led paint Pb_3O_4, lead white or lead chromate) or chromium (VI) containing pigments (for example lead chromate).Waste blasting materials from blasting of boats or ships which have been coated with toxic or ecotoxic anti-fouling paints. The possible contents of heavy metals in the unused blasting material shall be accounted for in the overall assessment [12 01 16*].
9. Corrosive liquids which have pH <2 or pH >11,5 [many waste codes may be covered].
10. Contaminated packaging which contains or has contained chemicals which are classified so as to be labelled with the danger symbol skull and crossbones ("Very toxic T+", "Toxic T"), or the danger symbol "Corrosive" in combination with the risk phrase R35 (very corrosive) or the danger symbol "Dangerous for the environment" (dead fish, "Ecotoxic N"). In addition, contaminated packaging which is labelled with the risk phrases R 52-53 alternatively R 52/53 (Harmful for aquatic organisms, may cause adverse long term effects in the aquatic environment) should be included [for example 15 01 10*].
11: Isolating window panes, sealed with glue [i.e. sealed glazing units], produced from 1956 until 1973 and fluorescent-lamp fittings with phase compensating capacitor(s) from the same time period, if it can not be proved that the capacitor is PCB-free [17 09 02*].
12. Elastic sealants for construction joints and slip-preventing floorings from buildings / constructions completed or refurbished in the time period 1956 – 1973 and where it cannot by chemical analysis be proved that these are PCB-free [17 09 02*].

19 H-criteria and R-Phrases under Directive 67/548/EEC

Existing text	Existing text		R-Phrase
WFD Annex III	DoW	LoW Art. 2	DSD
H1 Explosive	DoW substances and preparations which may explode under the effect of flame or which are more sensitive to shocks or friction than dinitrobenzene.	/	R2 R3
H2 Oxidising	DoW: substances and preparations which exhibit highly exothermic reactions when in contact with other substances, particularly flammable substances.	/	R7 R8 R9
H3 A Highly flammable	– liquid substances and preparations having a flash point below 21 °C (including extremely flammable liquids), or – substances and preparations which may become hot and finally catch fire in contact with air at ambient temperature without any application of energy, or – solid substances and preparations which may readily catch fire after brief contact with a source of ignition and which continue to burn or to be consumed after removal of the source of ignition, or – gaseous substances and preparations which are flammable in air at normal pressure, or – substances and preparations which, in contact with water or damp air, evolve highly flammable gases in dangerous quantities.	/	R11 R12 R15 R17
H3 B Flammable	liquid substances and preparations having a flash point equal to or greater than 21 °C and less than or equal to 55 °C		R10
H6 'Toxic':	substances and preparations (including very toxic substances and preparations) which, if they are inhaled or ingested or if they penetrate the skin, may involve serious, acute or chronic health risks and even death.	one or more substances classified as very toxic at a total concentration	R26 R27 R28 R39/+
		one or more substances classified as toxic at a total concentration	R23 R24 R25 R39/+ R48/+
H5 Harmful	substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may involve limited health risks	one or more substances classified as harmful at a total concentration	R20 R21 R22 R48/+ R68/+ R65
H8 Corrosive	substances and preparations which may destroy living tissue on contact	one or more corrosive substances classified as R35 at a total concentration	R35
		one or more corrosive substances classified as R34 at a total concentration	R34
H4 Irritant	non-corrosive substances and preparations which, through immediate, prolonged or repeated contact with the skin or mucous membrane, can cause inflammation	one or more irritant substances classified as R41 at a total concentration	R41
		one or more irritant substances classified as R36, R37, R38 at a total concentration	R36 R37 R38
H7 Carcinogenic	substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce cancer or increase its incidence	one substance known to be carcinogenic of category 1 or 2 at a concentration	R45 R49
		one substance known to be carcinogenic of category 3 at a concentration	R40
H10 Reprotoxic	substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce non-hereditary congenital malformations or increase their incidence	one substance toxic for reproduction of category 1 or 2 classified as R60, R61 at a concentration	R60 R61 R60-61 R60-61

Existing text WFD Annex III	Existing text DoW	LoW Art. 2	R-Phrase DSD
		one substance toxic for reproduction of category 3 classified as R62, R63 at a concentration	R62
			R63
			R62-63
H11 Mutagenic	substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce hereditary genetic defects or increase their incidence	one mutagenic substance of category 1 or 2 classified as R46 at a concentration	R46
		one mutagenic substance of category 3 classified as R40 at a concentration	R68
H14 Ecotoxic	waste which presents or may present immediate or delayed risks for one or more sectors of the environment		R50 R50-53 R51-53 R52-53 R53 R51 R52 R54 R55 R56 R57 R58 R59
H9	substances and preparations containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms		
H12	Waste which releases toxic or very toxic gases in contact with water, air or an acid		
H15	Waste capable by any means, after disposal, of yielding another substance, e.g. a leachate, which possesses any of the characteristics listed above.		
New: Sensitizing	substances and preparations which, if they are inhaled or if they penetrate the skin, are capable of eliciting a reaction of hypersensitization such that on further exposure to the substance or preparation, characteristic adverse effects are produced		R42 R43

20 list of potentially relevant mirror entries (portion of hazardous waste amounts in mirror pairs >70%)

Mirror number (counter)	LoW_Code
5	01 04 07*
	01 04 11
10	02 01 08*
	02 01 09
15	05 01 09*
	05 01 10
29	07 07 11*
	07 07 12
30	08 01 11*
	08 01 12
31	08 01 13*
	08 01 14
33	08 01 17*
	08 01 18
35	08 03 12*
	08 03 13
36	08 03 14*
	08 03 15
40	08 01 13*
	08 04 14
53	10 03 19*
	10 03 20
54	10 03 21*
	10 03 22
55	10 03 23*
	10 03 24
56	10 03 25*
	10 03 26
57	10 03 27*
	10 03 28
68	10 08 19*
	10 08 20
74	10 09 15*
	10 09 16
79	10 10 13*
	10 10 14
80	10 10 15*
	10 10 16
93	11 01 11*
	11 01 12
94	11 01 13*
	11 01 14
99	13 03 01*

Mirror number (counter)	LoW_Code
	13 03 06*
100	15 02 02*
	15 02 03
102	16 01 14*
	16 01 15
104	16 02 09*
	16 02 10*
110	16 05 04*
	16 05 05
126	18 01 06*
	18 01 07
129	18 02 05*
	18 02 06
132	19 01 13*
	19 01 14
136	19 02 08*
	19 02 09*
	19 02 10
149	19 13 03*
	19 13 04
152	20 01 25
	20 01 26*
153	20 01 27*
	20 01 28
156	20 01 33*
	20 01 34

21 Harmonised classification of heavy metals and hydrocarbons in Annex I DSD

Substance name	EC number	classification
Benzo[*def*]chrysen; , Benzo[*a*]pyren	200-028-5	Carc. Cat. 2; R45, Muta. Cat. 2; R46, Repr. Cat. 2; R60-61, R43, N; R50-53
Dibenz[*a,h*]anthracen	200-181-8	Carc. Cat. 2; R45, N; R50-53
Chromtrioxide	215-607-8	O; R9, Carc. Cat. 1; R45, Muta. Cat. 2; R46, Repr. Cat. 3; R62, T+; R26, T; R24/25-48/23, C; R35, R42/43, N; R50-53
Lead alcyls	-	Repr. Cat. 1; R61, Repr. Cat. 3; R62, T+; R26/27/28, R33, N; R50-53
Lead compounds, except separately listed	-	Repr. Cat. 1; R61, Repr. Cat. 3; R62, Xn; R20/22, R33, N; R50-53
Potassium dichromate	231-906-6	O; R8, Carc. Cat. 2: R45, Muta. Cat. 2; R46, Repr. Cat. 2; R60-61, T+; R26, T; R25-48/23, Xn; R21, C; R34, R42/43, N; 50-53
Sodium dichromate	234-190-3	O; R8, Carc. Cat. 2; R45, Muta. Cat. 2; R46, Repr. Cat. 2; R60-61, T+; R26, T; R25-48/23, Xn; R21, C; R34, R42/43, N; 50-53
Chromium dichloride; , Chromium oxychloride	239-056-8	O; R8, Carc. Cat. 2; R49, Muta. Cat. 2; R46, C; R35, R43, N; R50-53
Sodium dichromate, dihydrate	234-190-3	O; R8, Carc. Cat.2; R45, Muta. Cat. 2; R46, Repr. Cat. 2; R60-61, T+; R26, T; R25-48/23, Xn; R21, C; R34, R42/43, N; R50-53
Cadmium sulphate	233-331-6	Carc. Cat. 2; R45, Muta. Cat. 2; R46, Repr. Cat. 2; R60-61, T; R48/23/25, T+; R26, T; R25, N; R50-53
Cadmium chloride	233-296-7	Carc. Cat. 2; R45, Muta. Cat. 2; R46, Repr. Cat. 2; R60-61, T+; R26, T; R25-48/23/25, N; R50-53
Cadmium fluoride	232-222-0	Carc. Cat. 2; R45, Muta. Cat. 2; R46, Repr. Cat. 2; R60-61, T+; R26, T; R25-48/23/25, N; R50-53
Sodium chromate	231-889-5	Carc. Cat. 2; R45, Muta. Cat. 2; R46, Repr. Cat.2; R60-61, T+; R26, T; R25-48/23, Xn; R21, C; R34, R42/43, N; R50-53
Cadmium sulphide	215-147-8	Carc. Cat. 2; R45, Muta. Cat. 3; R68, Repr. Cat. 3; R62-63, T; R48/23/25, Xn; R22, R53
Ammonium dichromate	232-143-1	E; R2, O; R8, Carc. Cat. 2; R45, Muta. Cat. 2; R46, Repr. Cat. 2; R60-61, T+; R26, T; R25-48/23, Xn; R21, C; R34, R42/43, N; R50-53
Potassium chromate	232-140-5	Carc.Cat. 2; R49, Muta.Cat.2;R46, Xi;R36/37/38, R43, N;R50-53
Antimony trichloride	233-047-2	C; R34, N; R51-53
Tintetrachlorided	231-588-9	C; R34, R52-53
Antimony pentachloride	231-601-8	C; R35, N; R51-53
Cadmium diformiate	224-729-0	T; R23/25, R33, Xn; R68, N; R50-53
Cadmium iodid	232-223-6	T; R23/25, R33, Xn; R68, N; R50-53
Cadmium hexafluorosilicate(2-)	241-084-0	T; R23/25, R33, Xn; R68, N; R50-53
Tributyltin compounds, except those listed here	-	T; R25-48/23/25, Xn; R21, Xi; R36/38, N; R50-53
Ziram (ISO); tin-bis(*N,N*-dimethyl-dithiocarbamate)	205-288-3	T+; R26, Xn; R22-48/22, Xi; R37-41, R43, N; R50-53
Trimethyl-tin compunds, exept those listed here	-	T+; R26/27/28, N; R50-53
Triethyl-tin compounds, except those listed here	-	T+; R26/27/28, N; R50-53
Cadmium cyanide	208-829-1	T+; R26/27/28, R32, R33, Xn; R68, N; R50-53
Dimethyl mercury; [1] , Diethyl mercury [2]	209-805-3 [1], 211-000-7 [2]	T+; R26/27/28, R33, N; R50-53
Organic mercury compounds, except those listed here	-	T+; R26/27/28, R33, N; R50-53
Inorganic mercury compounds except mercury silver (II)sulphide and those listed here	-	T+; R26/27/28, R33, N; R50-53
Trioctyl- tin compounds, except those listed here	-	Xi; R36/37/38, R53
Cadmium compounds, except (xCdS.yCdSe) and mixtures of cadmium sulphide and zink sulfide (xCdS.yZnS), and mixtures of cadmium sulphide and mercury solphide as well as other listed cadmium compounds listed here	-	Xn; R20/21/22, N; R50-53
Fluortripentylstannan; [1] , Hexapentyldistannoxan [2]	243-546-7 [1], 247-143-7 [2]	Xn; R20/21/22, N; R50-53
Fluortrihexylstannan	243-547-2	Xn; R20/21/22, N; R50-53
Tetracyclohexylstannan; [1] , Chlortricyclohexylstannan; [2] , Butyltricyclohexylstannan [3]	215-910-5 [1], 221-437-5 [2], 230-358-5 [3]	Xn; R20/21/22, N; R50-53
Antimony compounds except Sb_2O_4, Sb_2O_5, Sb_2S_3, Sb_2S_5 as well as antimouny compounds listed separately here	-	Xn; R20/22, N; R51-53
Zinkchloride	231-592-0	Xn; R22, C; R34, N; R50-53

22 Appraisal of waste amounts contaminated with PCDD/F [BIPRO 2005]

Waste category		LoW entries (exemplary)		Total waste amount (kt/y)	Waste exceeding 1 ppb (kt/y)	Waste exceeding 5 ppb (kt/y)	Waste exceeding 10 ppb (kt/y)	Waste exceeding 15 ppb (kt/y)
MSWI								
	Fly ash, filter dust and other FGT residues			1048	733,9	104,8	52,4	21
		1901	**wastes from incineration or pyrolysis of waste**					
		190113	fly ash containing dangerous substances					
		190114	fly ash other than those mentioned in 190113					
	Bottom Ash			10124				
		190111*	Bottom ash and slag containing dangerous substances					
		190112	Bottom ash and slag other than those mentioned in 190111					
	Boiler Ash			155				
		190115*	Boiler dust containing dangerous substances					
		190116	Boiler dust other than those mentioned in 190115					
	Hydoxide sludge			187	130,9	18,7		
		190105*	filter cake from gas treatment					
HWI								
	Fly ash, filter dust and other FGT residues			198				
		190113	fly ash containing dangerous substances					
		190199	wastes not otherwise specified					
		190114	fly ash other than those mentioned in 190113					
	Boiler Ash			158				
		190115*	Boiler dust containing dangerous substances					
		190116	Boiler dust other than those mentioned in 190115					
	Bottom Ash			669				
		190111*	Bottom ash and slag containing dangerous substances					
		190112	Bottom ash and slag other than those mentioned in 190111					
Power production coal								
	Ashes			100819				
		10	**Wastes from thermal processes**					
		1001	**wastes from power stations and other combustion plants (except 19)**					
		100101	bottom ash, slag and boiler dust (excluding boiler dust mentioned in 100104)					

Waste category		LoW entries (exemplary)		Total waste amount (kt/y)	Waste exceeding 1 ppb (kt/y)	Waste exceeding 5 ppb (kt/y)	Waste exceeding 10 ppb (kt/y)	Waste exceeding 15 ppb (kt/y)
		100102	coal fly ash					
		100104*	oil fly ash and boiler dust					
		100113*	fly ash from emulsified hydrocarbons used as fuel					
		100114*	bottom ash, slag and boiler dust from co-incineration containing dangerous substances					
		100115	bottom ash, slag and boiler dust from co-incineration other than those mentioned in 100114					
		100116*	fly ash from co-incineration containing dangerous substances					
		100117	fly ash from co-incineration other than those mentioned in 100116					
		100118*	wastes from gas cleaning containing dangerous substances					
Power production biomass								
	Fly ash and other solid residues			533	372,9	53,3	37,3	26,6
		100103	fly ash from peat and untreated wood					
		100199	wastes not otherwise specified					
Hospital waste incineration EU 10								
	bottom ash			16				
		100101	bottom ash, slag and boiler dust (excluding boiler dust mentioned in 100104)					
	fly ash			13	8,8	3,8		
		100113*	fly ash from emulsified hydrocarbons used as fuel					
		100104*	oil fly ash and boiler dust					
EDC production								
	sludge			2				
		07	**WASTES FROM ORGANIC CHEMICAL PROCESSES**					
		0702	**wastes from the MFSU of plastics, synthetic rubber and man-made fibres**					
		070211*	sludges from on-site effluent treatment containing dangerous substances					
		070212	sludges from on-site effluent treatment other than those mentioned in 070211					
MBT (DE, AT)								
	heavy fraction			1749				
		1902	**wastes from physico/chemical treatments of waste (including dechromatation, decyanidation, neutralisation)**					
		190209*	solid combustible wastes containing dangerous substances					
		190210	combustible wastes other than those mentioned in 190208 and 190209					

Waste category		LoW entries (exemplary)		Total waste amount (kt/y)	Waste exceeding 1 ppb (kt/y)	Waste exceeding 5 ppb (kt/y)	Waste exceeding 10 ppb (kt/y)	Waste exceeding 15 ppb (kt/y)
Sinter plant								
	Residues from FGT			64	44,8	6,4		
		1002	**wastes from the iron and steel industry**					
		100299	wastes not otherwise specified					
Electric arc furnaces								
	Slag			9600				
		100202	unprocessed slag					
		100201	wastes from the processing of slag					
	Filter dust			1113	779,4	111,3	55,7	33,4
		100299	wastes not otherwise specified					
		1009	**wastes from casting of ferrous pieces**					
Iron smelting								
	Used sand			780				
		100907*	casting cores and moulds which have undergone pouring containing dangerous substances					
		100908	casting cores and moulds which have undergone pouring other than those mentioned in 100907					
		1002	**wastes from the iron and steel industry**					
	Residues from FGT			69	48,5	6,9		
		100207*	solid wastes from gas treatment containing dangerous substances					
		100208	solid wastes from gas treatment other than those nmentioned in 100207					
		1006	**wastes from copper metallurgy**					
Secondary copper								
	Filter dust			6	4,1	4,1	1,8	0,6
		100603*	flue gas dust					
		100606	other particulates and dust					
	Slag			600				
		100601	slags from primary and secondary production					
	KRS-Oxid			95	66,2	9,5		
		100699	wastes not otherwise specified					
Secondary aluminium								
	Filter dust			43	39	34,7	21,7	4,3
		1003	**Wastes from aluminium thermal metallurgy**					
		100319*	flue-gas dust containing dangerous substances					
		100320	flue-gas dust other than those mentioned in 100319					
	Sludges from WWT			5	3,7			
		100399	wastes not otherwise specified					

Waste category		LoW entries (exemplary)		Total waste amount (kt/y)	Waste exceeding 1 ppb (kt/y)	Waste exceeding 5 ppb (kt/y)	Waste exceeding 10 ppb (kt/y)	Waste exceeding 15 ppb (kt/y)
		1908	**wastes from waste water treatment plants not otherwise specified**					
		190814	sludges from other treatment of industrial waste water other than those mentioned in 190813					
Secondary zinc								
	Slag			4262				
		1005	**wastes from zinc metallurgy**					
		100501	slags from primary and secondary production					
	Absorption and filter material			2	1,6			
		100599	wastes not otherwise specified					
	Waelz oxide			945				
		100501	slags from primary and secondary production					
Sewage sludge								
	Sewage sludge			9900				
		1902	**wastes from physico/chemical treatments of waste (including dechromatation, decyanidation, neutralisation)**					
		190205*	sludges from physico/chemical treatment containing dangerous substances					
		190206	sludges from physico/chemical treatment other than those mentioned in 190205					
Compost								
	Compost			16000				
		1905	**wastes from aerobic treatment of solid wastes**					
		190503	off-specification compost					
Domestic burning								
		1901	**wastes from incineration or pyrolysis of waste**					
	ash (fossil fuels)	190199	wastes not otherwise specified	2716				
	ash (wood)	190199	wastes not otherwise specified	868				
	soot (fossil fuels)	190199	wastes not otherwise specified	14	10,1	8,7	1,4	
	soot (wood)	190199	wastes not otherwise specified	15	10,7	6,1	1,5	
Totals				**162.768**	**2.255**	**368**	**172**	**86**

23 Second questionnaire on the Implementation of the LoW Commission Decision 2000/532/EC

Preliminary remarks

This second questionnaire covers some additional issues raised in the ongoing discussion about the implementation of the LoW and its future amendments.

Please fill in the questionnaire electronically and insert as many lines as needed for your answers.

Wherever it is more convenient for you to provide information in separate documents please feel free to do so.

Your institution might have commented on some aspects of the questionnaire already in the previous questionnaire. If this is the case you do not need to provide your answers again since they are already in our records.

We kindly ask you the return the questionnaire by August 17th 2008 to

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If you have any questions I would be pleased to be contacted.

Your contact details

Name of the institution:

Department/Unit:

Name:

Phone:

Email:

Problems with regard to analytical issues, test methods or problems with limit values for specific substances, substance classes or waste types

A similar question has already been part of questionnaire 1. However, here we are focussing at analytical issues, test methods and problems with limit values and not at the other reasons that may impose difficulties with the classification of waste.

Background

In some cases the classification of waste, even based on a laboratory analysis, is not easy to carry out. For example

- Road construction material containing tar is to be classified as hazardous due to its carcinogenic property, if it contains more than 1000 mg/kg tar. Since tar is not easy to analyse alternative approaches could be taken. It could, for example, be agreed upon by convention that 20% of the tar appears as PAH (16 PAH). This means that 200 mg PAH/kg could be considered as threshold above which a waste is hazardous. Alternatively, by virtue of the Benzo(a)Pyrene content a concentration limit of 50 mg/kg Benzo(a)Pyrene could be agreed upon by convention.
- The unambiguous classification of hydrocarbons has proven difficult. They cover complex mixtures of various chemical compounds and their composition may also vary significantly according to the basic ingredient and the refining process. Using different analytical techniques, e.g. infra-red spectro-photometry and gas chromatography separation together with a mass spectrometer as well as different extraction methods, may lead to different classification results.
- Concentration limits for heavy metal could be set related to the elements regardless of the compounds of the metals. This approach could be taken in order to avoid costs for extensive analysis. In the context of such an approach it is an open question, to what extent the leaching behaviour of different metal compounds may be neglected against the advantages gained from such a simplification.
- Some compounds classified as carcinogenic by the IARC (e.g. formaldehyde) are not classified as carcinogenic by Directive 67/548/ EEC.

Which are according to your experience the most serious classification problems with regard to analytical aspects, test methods or problems with limit values for specific substances, substance classes or waste types?

Please describe the problems and the concerned waste codes or substances, substance classes or waste types. Sort the problems according to their relevance starting with the most serious one.

Specify the extent and the possible impact of the listed classification problems (e.g. frequency of the problem, burden to companies / administration, possible environmental impacts through misclassification, etc.)

Describe how the listed problems are handled in practice.

Additional information about the hazardousness of a waste

When a waste is characterised as hazardous it gets a waste code which is marked with an asterisk. The property which renders the waste hazardous (the specific H-criterion) is not communicated via the waste code in most of the cases.

However, in some countries the information about the relevant H-criterion is communicated via additional documents which are sent together with the waste to the waste management installations (e.g. based on Article 5 of the Hazardous Waste Directive[7] in conjunction with Section A of Annex I to Council Directive 84/631/EEC[8]).

Does a document, which shows the relevant H-criterion/criteria for the waste, accompanies hazardous wastes in your country?

The "new" Waste Framework Directive[9] provides in Article 19 "Labelling of hazardous waste"

"Whenever hazardous waste is transferred within a Member State, it shall be accompanied by an identification document, which may be in electronic format, containing the appropriate data specified in Annex IB to Regulation (EC) No 1013/2006."

Annex IB to Regulation (EC) No 1013/2006 specifies, inter alia:

"13 Physical characteristics
14 viii H-code"

Is it intended to amend legislation in your country in the light of these provisions of the (new) WFD mentioned above?

If yes: Will your new legislation require communicating the H-criterion?

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[7] Where hazardous waste is transferred, it shall be accompanied by an identification form containing the details specified in Section A of Annex I to Council Directive 84/631/EEC of 6 December 1984 on the supervision and control within the European Community of the transfrontier shipment of hazardous waste (1), as last amended by Directive 86/279/EEC.

[8] ANNEX I to Council Directive 84/631/EEC of 6 December 1984 on the supervision and control within the European Community of the transfrontier shipment of hazardous waste
17. Nature of the risk: Explosive / Reactive / Corrosive / Toxic / Flammable / Other
18. Outward appearance of the waste at . . . °C: Powdery or Pulverulent / Solid / Viscous or Syrupy / Sludgy / Liquid / Gaseous / Other

[9] Parliaments Position of June 17th 2008

23.1 Answers to second qustionnaire

Member State	Answers to the question "Which are according to your experience the most serious classification problems with regard to analytical aspects, test methods or problems with limit values for specific substances, substance classes or waste types? Specify the extent and the possible impact of the listed classification problems (e.g. frequency of the problem, burden to companies / administration, possible environmental impacts through misclassification, etc.) Describe how the listed problems are handled in practice"
NL	• No information
BG	• Characterisation of waste with organic hazardous substances most problematic • Missing standard for tests • Analysis of metal compounds is too costly
PL	• The Ministry of Environment doesn't have any information that the waste classification as hazardous is problematic
EE	• Analysis of different decomposition and pyrolysis products of fuels (oil shale etc) and wastes (→ precautionary principle all pyrolysis waste = hazardous waste?) • Full analysis of metal compounds too expensive (→ analysis per element and estimation of hazardousness)
FI	• More guidance on test methods • List of Wastes and the most recent knowledge on the hazardousness of various chemicals are not in line. Example: classification of Chromium containing wastes (entries 04 01 06 and 04 01 08). Besides Cr(VI), also Cr(III)-ion is hazardous to the environment (N,R51-53) according to European Union Risk Assessment Report[10] published in 2002 • A standardized test method for testing monolithic blocs would be needed • More guidance on Sampling and the definition of population • Analysis of hydrocarbons in oil containing waste; analytical problems with oil containing waste • Analysis of metal compounds • Analytical problems especially related to chemical transformation of residues in packages (ageing etc) • There is too little information available on the environmental effects of organic compounds • How to take into account in classification procedure that treatment of waste might change its hazardous properties (e.g. stabilization and solidification)
HU	• No link between waste analysis and subsequent treatment path • No limit values for criteria H3, H8, H9, H 11, H12 H13 and H14 in LoW • No suitable analytical methods available for the communal waste • No EU standard method available for sampling and sample preparation. • No method for the biologically degradable content. - standard methods for screening missing.
IT	• Classification procedure for waste containing hydrocarbons of unknown origin, with particular attention to the attribution of the H7 property • Missing reference methodology to determine total hydrocarbons • Missing EU standards for waste testing/ analysis • European standard missing saying that high pH value could be used to classify waste as "irritant" • Formaldehyde should be included within the carcinogenic compounds according Dir. 67/548/EEC • Sampling of bulky scrap
DE NGS	• Limit value of 200mg PAK/kg (EPA) is too high • Not appropriate to fix individual limit value for Bens(a)pyrene of 50mg/kg • Dynamic link to chemicals legislation proposed
BE OVAM	• Efforts to characterize waste of unknown origin (e.g. sludge from industrial (on-site) effluent treatments, tank-cleaning sludge, shredder waste) • Characterisation of waste with varying composition • Simple, swift and reliable test methods needed • Sampling of bulky heterogeneous waste • concerned about the "worst case" manner according to which the most dangerous components of waste determine the hazardousness of waste
SE	• Classification of the waste type "road construction material containing tar" has created a major classifying problem ever since the entry "17 03 01* Bituminous mixtures containing coal tar" was introduced and the H7-criterion 0,1 weight % of coal tar was applied • 200 mg 16 PAH/kg waste may well be scientifically justified as an indicator of the intended coal tar limit (0,1 %), whereas the optional use of 50 mg BaP /kg waste is turned down since this level obviously reflects a coal tar content of more than 1% coal tar in the waste which is more than tenfold the intended limit for coal tar • If, for practical reasons, concentration levels of total contents of metals (or certain dangerous species like Cr VI) is considered as operational, then it should be provided for that these limits in a conservative way reflect the limits for metal compounds in the chemical legislation.
UK	• A better definition of hydrocarbons is required (See below) • Measurement of Benzo(a)pyrene can be difficult when at 0.1% mineral oil the BaP limit is 0.005% can be difficult (in the UK the BaP limit to carcinogensity is applied to the oil contamination and this value assumes 0.1% oil

[10] European Union Risk Assessment Report on Chromium trioxide (CAS No. 1333-82-0), Sodium chromate (CAS No. 7775-11-3), Sodium dichromate (CAS No. 10588-01-9), Ammonium dichromate (CAS No. 7789-09-5) Potassium dichromate (CAS No. 7778-50-9). Report for CSTEE. November 2002. United Kingdom.

	• With regards to the analysis of waste: use of parametric statistics on non-normally distributed data • PCB contaminated wastes and the lack of a method to determine the risks of secondary poisoning • Concentration limits for heavy metals and the gap between what is considered hazardous waste and concentrations of metals which may have an adverse impact on human health or the wider environment. • The time taken to carry out analysis of waste samples is lengthy, which can delay disposal of waste materials • The current WAC leaching test (WAC BS EN 12457) is a long procedure which must be very carefully managed to get meaningful results. • Complex wastes such as sludges, filtercakes, ashes and contaminated soils are often difficult to assess. • There are problems with sampling, lack of heterogeneity and testing methods. • Simple analysis returns predominately metal cations. However, in many cases knowledge of the input wastes, site history and process function may inform selection of worst case scenario compounds that will enable desktop assessment. • The assessment of IBA is an issue as direct testing methods are not only costly but have little value due to the difficult nature of the waste. (One of our regulators has aligned their assessment of IBA with CHIP and DPD). • In general, sampling strategies and data interpretation where some samples are hazardous and some are non-hazardous are problematic (eg contaminated soils/land remediation). Where waste is heterogeneous, average and confidence intervals can be unreliable.

24 Examples of tables of independent descriptors as developed by OVAM

24.1 Table A : nature

id	b
1	Waste classified by function in a former
2	Natural gas
3	absorbent, adsorbent and packaging
4	Anode
5	Appliances
6	Batteries and accumulators
7	Biocide
8	bleaching agent
9	extinguishing agent
10	building material
11	Fuel
12	Cosmetics
13	propellant
14	electrolyte or batteries or accumulators
15	Explosives
16	film and celluloid
17	photo chemicals
18	photographic paper
19	Medicinal products and chemicals
20	foundry sand
21	Mould core, mould form
22	Yeast
23	Glass other than packaging material
24	ion exchanger / ion exchanger resin
25	insulation material
26	Cable
27	Catalyst
28	Cooling agents
29	Lamps
30	Tannin
31	pneumatic tyres
32	Solvents, coatings (paint, lacquer, enamel), glue, gum
33	polishing agent
34	process bath
35	pvc softener
36	waste classified according to biotic origin
37	other waste
38	lubricants and industrial oils
39	Fabric and leather

40	Abrasive
41	Carpets and mats
42	Food preservative agent
43	Food
44	Vehicles and industrial rolling stock
45	Disposable camera
46	Anima waste (other than oils or fats)
47	human waste
48	Vegetable waste (other than oils and fats)
49	Vegetable o animal oils and fats, wax
50	Ashes and cinder
51	Dredging mud
52	black (green) liquor
53	Compost
54	Concentrate
55	distillation- and refinery residue
56	Dross
57	Extraction residue
58	Fermentation residue
59	Filter cake
60	Gypsum
61	Scale
62	Mother liquor
63	Furnace rubbish
64	Percolate
65	Reaction residue
66	Flue gas waste
67	Screening waste
68	Slime
69	Shredder waste
70	Skimming
71	Waste classified by chemical nature
72	Fermented material
73	Washing liquid
74	Unidentified or new substance
75	Mixtures (residual fraction)
76	other waste
77	Abiotic natural products
78	asbestos
79	Asphalt, tar and tar products
80	plastic other than packaging
81	metal / scrap
82	Sot
83	rubber other than pneumatic tyres
84	Acids and bases
85	absorbent, rags, protective clothing
86	adsorbent, filter, filter cell, filtering material
87	packaging
88	condenser and transformer

89	White- and brown goods
90	Waste
91	Carbon strips
92	other appliances and machines
93	Accumulators
94	Battery
95	wood hardening agent
96	other biocide
97	asbestos cement
98	Concrete
99	building stone
100	cement
101	cement composite material
102	gypsum board and material
103	Marble
104	tiles and ceramic building materials
105	Ammunition
106	Explosive
107	Firework
108	Bleaching fixer
109	Bleach
110	fixer
111	offset-developer
112	developer
113	coloured glass
114	Non coloured glass
115	Catalysts
116	Industrial catalyst
117	TL lamps and corona discharge lamps
118	other lamp
119	pneumatic tyres of buses
120	pneumatic tyres of vans and lorries < 3,5 ton (category N1)
121	pneumatic tyres of agricultural machines
122	pneumatic tyres of tractors
123	pneumatic tyres of lorries > 3.5 ton
124	pneumatic tyres of motorcycles
125	pneumatic tyres of private vehicles (category M1)
126	pneumatic tyres of public works equipment
127	coatings (paint, lacquer, enamel), ink, glue and resin
128	solvent and detergent
129	pickling preparation
130	Hardening salt
131	degreasing bath
132	other process bath
133	hydraulic oil and brake fluid
134	motor-, transmission- and lubricant
135	oil and other liquids for heat transfer and insulation

136	oil –water mixture
137	Paraffin oil
138	bilge oil
139	Cutting, polishing, drilling and welding soil
140	Grease – oil mixture
141	clothing, footwear and clothing accessories
142	Fabrics
143	Discarded motor vehicle
144	caravan, motor home,
145	Ship
146	tanks, military rolling stock
147	Industrial rolling stock
148	Aeroplane
149	Battery-containing disposable camera
150	Battery-free disposable camera
151	faeces, urine, manure
152	Gelatine
153	Carcasses
154	Fleshing waste
155	Slaughterhouse waste
156	Fish waste
157	other animal waste
158	Limbs, organs, human blood, blood bags
159	night soil
160	Septic materials
161	Sugar-beat pulp
162	Cellulose
163	Pomace
164	Vegetables, fruit and garden waste
165	wood and paper
166	Treacle
167	Tobacco
168	Vegetable of animal oils
169	Vegetable of animal fats and wax
170	Ground ash
171	Boiler ash
172	Furnace ash
173	Fly ash
174	Distillation residue
175	Refinery residue
176	black dross
177	white dross
178	Shredder waste (light fraction)
179	Shredder waste (heavy fraction)
180	Ore / mineral
181	Expanded sterilised perlite
182	Grovel
183	Earth and stones
184	Sand

185	Asphalt
186	Tar and tar products
187	precious metals
188	Iron / scrap iron other than stainless steel
189	Allows
190	Non-ferrous scrap
191	Latex rubber
192	Other synthetic rubber
193	Base
194	Acids
195	Absorbent
196	protective clothing
197	rags / cleaning material
198	Adsorbent
199	filter / filter cell
200	Filtering material
201	rubble, multi-layer packaging material
202	Boxes and crates
203	Bottles and bowls
204	Foil and wrapping material
205	Pressurised containers; other than spray can and non industrial aerosol cans
206	Mixture of packaging materials
207	Pallets
208	Span ribbons
209	Sprayers and aerosols
210	Vats
211	Bags
212	Condensers
213	transformers
214	brown goods
215	small householder appliances
216	white goods
217	Machine parts
218	Machines
219	inorganic wood hardening agent
220	Organic wood hardening agent
221	inorganic biocide <> wood hardening agent
222	Organic biocide <> wood hardening agent
223	Coatings
224	Ink
225	Coal scuttle
226	colouring agent
227	glue, resin and gum
228	Pigment
229	Toner
230	solvent
231	Soap and detergent
232	hydraulic oil

233	brake fluid
234	machine oil
235	motor oil
236	insulation fluid / thermal oil
237	transformer oil
238	fur, leather
239	Attire with the exception of fur, leather
240	fabrics of composite materials
241	fabrics of animal material
242	fabrics of mixed material
243	fabrics of plant material
244	fabrics of synthetic material
245	Bus
246	Van and lorry < 3,5 ton (cat N1)
247	Lorry > 3,5 ton
248	Motor cycle
249	private vehicle (cat M1)
250	Other industrial rolling stock
251	Agricultural machinery
252	Agricultural tractor
253	Public works equipment
254	Bones
255	Blood
256	untreated skin and pelts
257	feathers and hair
258	slaughterhouse waste heavy livestock
259	slaughterhouse waste light livestock
260	slaughterhouse waste poultry
261	Potato, fruit grain pomace
262	Malt, hop, barley pomace
263	Landscape refuse
264	Fruit and vegetables
265	bark, rind
266	Wood
267	Cork
268	paper and cardboard
269	animal oil
270	Oil seeds
271	Vegetable oil
272	Fish oil
273	Fax
274	Wax
275	Oil fly ash
276	Coal fly ash
277	Other fly ash
278	Earth
279	Clay
280	Loam
281	stones, rock

282	bitumen
283	Bitumen cokes
284	Pitch
285	Tar
286	Other tar products
287	Copper alloys; bronze, brass
288	Alloys other than copper alloys
289	Stainless steel
290	Aluminium scrap
291	Non-ferrous scrap other than aluminium
292	Natural latex rubber
293	synthetic latex rubber
294	Rags
295	other cleaning material (check utility in conversion)
296	ion exchanger
297	other adsorbent
298	inorganic filter
299	Organic filter
300	diatomacious earth
301	other filtering material
302	Screen containing brown goods
303	Screen containing brown goods
304	large white goods (cookers, washing machines, ...)
305	Small white goods (ovens, cooker hoods, ...)
306	Refrigerators and freezes
307	coating powder
308	Enamel
309	lacquer, paint and varnish
310	inorganic solvent
311	organic solvent
312	detergent
313	Soap
314	Mixed landscape refuse
315	Prunings
316	Cardboard
317	Paper
318	Betony clay
319	Other clay
320	copper / copper scrap
321	lead / lead scrap
322	zinc / zinc scrap
323	Other non ferrous metal/ metal scrap
324	Leaves
325	Law green material
326	Caps and covers
327	Thermometer

24.2 Table Ch ; main component / descriptive component

id	b
1	Chemical substances and chemicals
2	Components classified according to function in a former life + potential function or of off-specs
3	Components classified according to biotic origin
4	other components
5	waste classified according to chemical nature
6	inorganic substances / compounds / ions
7	organic chemicals / compounds
8	Specific elements
9	Binding agent
10	extinguishing agent
11	building material
12	electrolyte or batteries or accumulators
13	Glass
14	Solvent
15	animal waste (other than oils of fats)
16	Vegetable waste (other than oils and fats)
17	black (green) liquor
18	Fermented material
19	abiotic natural products
20	asphalt and tar
21	Benzene, kerosene and fuel oil
22	plastic
23	Metal
24	rubber other than pneumatic tyres
25	Acids and bases
26	Ammonium
27	inorganic acid
28	inorganic base
29	Arsenate
30	Azide
31	Borate
32	carbide
33	Carbonate
34	Chlorine anion in salts
35	Cyan anion
36	Phosphate
37	Gypsum
38	halogenide
39	hydroxide (with the exception of NaOH and CaOH)
40	Lime
41	Metal carbonyl
42	Nitrate

43	nitride (nitro-metal compound)
44	Oxide
45	peroxide (inorganic.)
46	Silicate
47	Water
48	Zeolite
49	Sulphur anion in salts
50	aromatic compounds
51	Non aromatic compounds
52	Classification according to functional groups
53	Alkaline-earth metals
54	Actinides
55	alkali metals
56	Boron
57	Chalcogenes
58	Inert gases
59	Halogens
60	Carbon
61	Lanthanides
62	metals, not previously mentioned
63	Silicon
64	Nitrogen group
65	Hydrogen
66	Concrete
67	building stone
68	Cement
69	cement composite material
70	Marble
71	Tiles ceramic building materials
72	coloured glass
73	Non-coloured glass
74	inorganic solvent
75	organic solvent
76	Treated skin, leather and pelts
77	animal fibre material
78	Gelatine
79	Cellulose
80	wood and paper
81	ore / mineral
82	Grovel
83	Earth and stones
84	Sand
85	asphalt
86	bitumen
87	Pitch
88	Tar
89	Thermo-hardening plastics
90	thermoplastics
91	Tin

92	Alloys
93	Latex rubber
94	synthetic rubber
95	Base
96	Acid
97	Phosphorous acid
98	Phosphoric acid
99	Nitrous acid
100	Nitric acid
101	Hydrogen fluoride
102	Hydrochloric acid
103	Sulphurous acid
104	Sulphuric acid
105	Ammonia
106	Calcium hydroxide
107	Sodium hydroxide
108	Chlorate
109	Hypochlorite
110	Perchlorate
111	Cyanate
112	Cyanide
113	Isocyanate
114	Thiocyanate
115	bromide
116	chloride
117	fluoride
118	iodine
119	Sulphate
120	Sulphide
121	Sulphite
122	aromatic amines
123	Creosotes
124	Dioxins
125	Phenols
126	Furans
127	Heterocyclic aromatic compounds
128	Monocyclic aromatic compounds
129	PCB and PCT
130	Polycyclic compounds
131	Aliphatic amines
132	Furfural
133	Glycerine
134	Organohalogens
135	Silicone
136	Stearine
137	Acetates
138	cyanides (nitrils)
139	Ethers
140	Mercaptanes

141	Organometal compounds
142	Peroxides
143	Barium
144	Beryllium
145	Calcium
146	Magnesium
147	Radium
148	Strontium
149	Plutonium
150	Uranium
151	other actinides
152	Potassium
153	Lithium
154	Sodium
155	other alkali metals: rubidium, caesium, francium
156	Polonium
157	Tellurium
158	Oxygen
159	Sulphur
160	Argon
161	Helium
162	Krypton
163	Neon
164	Radon
165	Xenon
166	Astatine
167	Bromium
168	Chlorine
169	Fluorine
170	Iodine
171	Active coal
172	Amorphous carbon
173	Diamond
174	Graphite
175	Precious metals
176	Heavy metal
177	other metals
178	Bismuth
179	
180	Nitrogen
181	Wool
182	other animal fibre material
183	bark, rind
184	Wood
185	Cork
186	paper and cardboard
187	Earth
188	Clay
189	Loam

190	stones, rock
191	Epoxy
192	Phenol resin, melamine resin
193	Polyester
194	Polyurethane
195	ABS (acrylonitrile butadiene styrene)
196	Fluorine plastics
197	PET (polyethylene terephtalate)
198	Polyacrylic
199	Polyamide
200	Polycarbonate
201	Polyethylene
202	Polypropylene
203	Polystyrene
204	Polyvinyl acetate, polyvinyl alcohol
205	pvc (polyvinyl chloride)
206	copper alloys : bronze, brass
207	Alloys other than copper alloys
208	Stainless steel
209	dioxin <> polychlorinated dibenzo-p-dioxin
210	Polychlorinated dibenzo-p-dioxin
211	furan <> polychlorinated dibenzo-furan
212	Polychlorinated dibenzo furan
213	Toluene
214	other monocyclic aromatic compounds
215	Anthracite
216	Naphthalene
217	Other polycyclic aromatic compounds
218	CFCs
219	Organochloline compound
220	Organochlorine compound
221	Organochlorine compound<> chlorine-, fluorine compound
222	Gold
223	Platinum group
224	Silver
225	Antimonite
226	Arsenic
227	cadmium
228	Chromium
229	Copper
230	Mercury
231	Lead
232	Manganese
233	Nickel
234	Selenium
235	Thallium
236	Tin
237	vanadium
238	Zinc

239	Iron
240	non ferrous metal
241	Cardboard
242	Paper
243	Bentony clay
244	other clay
245	HDPE
246	LDPE
247	Platinum
248	ruthenium, rhodium, palladium, iridium
249	Aluminium
250	Cobalt
251	Molybdenum, tungsten
252	Osmium
253	titanium, zirconium, hafnium
254	niobium, tantalum
255	Other transition metals: technetium, rhenium, gallium, indium, germanium, ruthenium
256	motor-, transmission- and lubricant
257	asbestos
258	Expanded polystyrene, isomo
259	other polystyrene
260	Chromic acid
261	Unknown
262	lubricants and industrial oils
263	Propellant
264	Cooling agent

24.3 Table Cv = polluting component

id	Description
1	chemical fabrics and chemicals
2	pollution classified according to function in a previous life
3	Pollution classified according to biotic origin
4	other pollution
5	Pollution classified according to chemical nature
6	Inorganic chemical fabrics / compounds / ions
7	Organic chemical fabrics/ compounds
8	Specific elements
9	batteries and accumulators
10	Biocide
11	extinguishing agent
12	Propellant
13	Electrolyte of batteries of accumulators
14	solvents, coatings (paint, lacquer, enamel), glue, gum
15	pvc softener
16	lubricants and industrial oils
17	Food preserving agent
18	Food
19	human waste
20	Plant waste (other than oils and fats)
21	Plant or animal oils and fats, waxes
22	black (green) liquor
23	Unidentified or new substance
24	Asbestos
25	asphalt and tar
26	benzene, kerosene and fuel oil
27	Plastic
28	Soot
29	Acids and bases
30	Acetate
31	Ammonium
32	Inorganic acid
33	Inorganic base
34	Arsenate
35	Azide
36	Borate
37	Carbide
38	Carbonate
39	Chlorine anion in salts
40	Cyan anion
41	Phosphate
42	Gypsum
43	Halogenide
44	hydroxide (met with the exception of NaOH and CaOH)
45	Metal carbonyl

46	Nitrate
47	nitride (nitro-metal compound)
48	Oxide
49	peroxide (inorg.)
50	Silicate
51	Water
52	Zeolite
53	Sulphur anion in salts
54	aromatic compounds
55	Non aromatic compounds
56	Classification according to function group
57	Alkaline earth metals
58	Actinides
59	alkali metals
60	Boron
61	Chalcogenes
62	Inert gases
63	halogens
64	Carbon
65	Lanthanides
66	metals not mentioned earlier
67	Silicon
68	Nitrogen group
69	Hydrogen
70	Accumulator
71	Battery
72	Wood hardening agent
73	other biocide
74	coatings (paint, lacquer, enamel), ink, glue and resin
75	solvent and detergent
76	hydraulic oil and brake fluid
77	motor-, transmission- and lubricant
78	oil and other liquids for heat transfer and insulation
79	oil –water mixture
80	Paraffin oil
81	bilge oil
82	Cutting, polishing, drilling, welding oil
83	Grease – oil mixture
84	Limbs, organs, human blood
85	night soil
86	Septic material
87	Vinegar
88	Plant of animal oils
89	Plant or animal fats and wax
90	Asphalt
91	Bitumen
92	Pitch
93	Tar
94	Thermo hardening plastics
95	thermoplastics
96	Base
97	Acid

98	Phosphorous acid
99	Phosphoric acid
100	Nitrous acid
101	Nitric acid
102	Hydrogen fluoride
103	Hydrochloric acid
104	Sulphurous acid
105	Sulphuric acid
106	Ammonia
107	Calcium hydroxide
108	Sodium hydroxide
109	Chlorate
110	Hypochlorite
111	Perchlorate
112	Cyanate
113	Cyanide
114	Isocyanate
115	Thiocyanate
116	Bromide
117	Chloride
118	Fluoride
119	Iodine
120	Sulphate
121	Sulphide
122	Sulphite
123	aromatic amines
124	Creosotes
125	Dioxins
126	Phenols
127	Furans
128	Heterocyclic aromatic compounds
129	Monocyclic aromatic compounds
130	PCB and PCT
131	Polycyclic compounds
132	Aliphatic amines
133	Furfural
134	Glycerine
135	Organohalogens
136	Silicone
137	Stearine
138	Acetates
139	cyanides (nitrils)
140	Ethers
141	Mercaptanes
142	Organometal compounds
143	Peroxides
144	Barium
145	Beryllium
146	Calcium
147	Magnesium
148	Radium
149	Strontium

150	Plutonium
151	Uranium
152	other actinides
153	Potassium
154	Lithium
155	Sodium
156	other alkali metals : rubidium, caesium, francium
157	Polonium
158	Tellurium
159	Oxygen
160	Sulphur
161	Argon
162	Helium
163	Krypton
164	Neon
165	Radon
166	Xenon
167	Astatine
168	Bromium
169	Chlorine
170	Fluorine
171	Iodine
172	Active coal
173	Amorphous carbon
174	Diamond
175	Graphite
176	Precious metal
177	Heavy metal
178	other metals
179	Bismuth
180	Phosphorous
181	Nitrogen
182	inorganic wood hardening agent
183	organic wood hardening agent
184	inorganic biocide <> wood hardening agent
185	organic biocide <> wood hardening agent
186	coatings
187	ink
188	kit
189	colouring agent
190	glue, resin and gum
191	pigment
192	toner
193	solvent
194	soap and detergent
195	hydraulic oil
196	brake fluid
197	machine oil
198	motor oil
199	insulation fluid / thermal oil
200	transformer oil
201	animal oil

202	Oil seeds
203	Vegetable oil
204	Fish oil
205	Fat
206	Was
207	Epoxy
208	Phenol resin, melamine resin
209	Polyester
210	Polyurethane
211	ABS (acrylonitrile butadiene styrene)
212	Fluorine plastics
213	PET (polyethylene terephtalate)
214	Polyacrylic
215	Polyamide
216	Polycarbonate
217	Polyethylene
218	Polypropylene
219	Polystyrene
220	Polyvinyl acetate, polyvinyl alcohol
221	pvc (polyvinyl chloride)
222	Dioxin <> polychlorinated dibenzo-p-dioxin
223	Polychlorinated dibenzo-p-dioxin
224	furan <> polychlorinated dibenzo furan
225	Polychlorinated dibenzo furan
226	Toluene
227	other monocyclic aromatic compounds
228	Anthracene
229	Naphthalene
230	other polycyclic aromatic compounds
231	CFC
232	Organochlorine compound
233	Organochlorine compound
234	Organohalogen compound <> chlorine-, fluorine compound
235	Gold
236	Platinum group
237	Silver
238	Antimony
239	Arsenic
240	cadmium
241	Chromium
242	Copper
243	Mercury
244	Lead
245	Manganese
246	Nickel
247	Selenium
248	Thallium
249	Tin
250	vanadium
251	Zinc
252	Iron
253	non ferrous metal

254	coating powder
255	enamel
256	lacquer, paint and varnish
257	inorganic solvent
258	organic solvent
259	HDPE
260	LDPE
261	Platinum
262	ruthenium, rhodium, palladium, iridium
263	Aluminium
264	Cobalt
265	molybdenum, wolfram
266	Osmium
267	titanium, zirconium, hafnium
268	niobium, tantalum
269	other transition metals: technetium, rhenium, gallium, indium, germanium, ruthenium

24.4 Table f = physical state

id	b
1	Gas
2	Liquid
3	Liquid
4	solution
5	Suspension
6	Emulsion
7	Sludge
8	liquid sludge
9	slurry
10	Regular and pasty
11	Solid
12	Fine particles; powder and dust
13	Scales; flakes
14	Fibres and wool
15	Fragments
16	Massive or glazed
17	Slag
18	Deep frozen
19	Sharp
20	other

24.5 Table h = hazard

Id	k	b
16	H0	Non-hazardous
15	Hx	Hazardous
1	H1	Explosive
2	H2	Oxidising
3	H3	Flammable
4	H4	Irritant
5	H5	Harmful
6	H6	Toxic
7	H7	Carcinogenic
8	H8	Corrosive
9	H9	Infectious
10	H10	Teratogenic
11	H11	Mutagenic
12	H12	Substance or preparation which in contact with water, air or acid generates toxic gas
13	H13	Substances and preparations which after removal give rise to another substance in one way or
14	H14	Ecotoxic

25 Intermediate translation table LoW → CLP

Existing text WFD Annex III	**Existing text LoW Art. 2**	**R-Phrase DSD**
H6 'Toxic':	one or more substances classified as very toxic at a total concentration	R26
		R27
		R28
	one or more substances classified as toxic at a total concentration	R23
		R24
		R25
H5 Harmful	one or more substances classified as harmful at a total concentration	R20
		R21
		R22
H8 Corrosive	one or more corrosive substances classified as R35 at a total concentration	R35
	one or more corrosive substances classified as R34 at a total concentration	R34
H4 Irritant	one or more irritant substances classified as R41 at a total concentration	R41
	one or more irritant substances classified as R36, R37, R38 at a total concentration	R36
		R37
		R38
H7 Carcinogenic	one substance known to be carcinogenic of category 1 or 2 at a concentration	R45
		R49
	one substance known to be carcinogenic of category 3 at a concentration	R40
H10 Reprotoxic	one substance toxic for reproduction of category 1 or 2 classified as R60, R61 at a concentration	R60
		R61
		R60-61
		R60-61
	one substance toxic for reproduction of category 3 classified as R62, R63 at a concentration	R62
		R63
		R62-63
H11 Mutagenic	one mutagenic substance of category 1 or 2 classified as R46 at a concentration	R46
	one mutagenic substance of category 3 classified as R40 at a concentration	R68

26 List of candidate entries to be shifted from mirror entries to absolute entries

LoW Code	N	Av	Min	Max	LoW Code	N	Av	Min	Max
01 04 07*	4	85%	38%	100%	11 02 06	2	97%	94%	100%
01 04 11	4	15%	0%	62%	12 01 20*	9	25%	0%	82%
02 01 08*	9	70%	0%	100%	12 01 21	9	75%	18%	100%
02 01 09	9	30%	0%	100%	13 03 01*	8	73%	6%	100%
05 01 09*	7	86%	37%	100%	13 03 06*	8	27%	0%	94%
05 01 10	7	14%	0%	63%	15 02 02*	10	79%	49%	97%
07 04 11*	4	74%	5%	100%	15 02 03	10	21%	3%	51%
07 04 12	4	26%	0%	95%	16 01 14*	9	78%	5%	100%
07 07 11*	4	73%	0%	100%	16 01 15	9	22%	0%	95%
07 07 12	4	28%	0%	100%	16 02 09*	9	83%	5%	100%
08 01 11*	10	79%	49%	98%	16 02 10*	9	17%	0%	95%
08 01 12	10	21%	2%	51%	16 05 04*	8	91%	62%	100%
08 01 13*	9	92%	66%	100%	16 05 05	8	9%	0%	38%
08 01 14	9	8%	0%	34%	16 10 01*	10	19%	1%	68%
08 01 17*	9	92%	69%	100%	16 10 02	10	81%	32%	99%
08 01 18	9	8%	0%	31%	16 10 03*	7	30%	0%	100%
08 03 12*	8	89%	58%	100%	16 10 04	7	70%	0%	100%
08 03 13	8	11%	0%	42%	16 11 03*	7	2%	0%	8%
08 03 14*	8	79%	0%	100%	16 11 04	7	98%	92%	100%
08 03 15	8	21%	0%	100%	16 11 05*	8	5%	0%	27%
08 01 13*	9	79%	2%	100%	16 11 06	8	95%	73%	100%
08 04 14	9	21%	0%	98%	17 01 06*	8	15%	0%	100%
10 01 16*	6	18%	0%	100%	17 01 07	8	85%	0%	100%
10 01 17	6	82%	0%	100%	17 03 01*	9	21%	0%	100%
10 01 05	9	51%	0%	100%	17 03 02	9	79%	0%	100%
10 01 07	9	25%	0%	92%	17 04 10*	9	12%	0%	100%
10 01 18*	9	1%	0%	7%	17 04 11	9	88%	0%	100%
10 01 19	9	23%	0%	100%	17 05 03*	10	30%	0%	100%
10 01 20*	7	25%	0%	93%	17 05 04	10	70%	0%	100%
10 01 21	7	75%	7%	100%	17 05 05*	8	13%	0%	100%
10 01 22*	8	60%	3%	100%	17 05 06	8	87%	0%	100%
10 01 23	8	40%	0%	97%	17 05 07*	6	21%	0%	100%
10 02 07*	8	63%	0%	100%	17 05 08	6	79%	0%	100%
10 02 08	8	37%	0%	100%	17 08 01*	7	17%	0%	100%
10 02 11*	5	59%	0%	100%	17 08 02	7	83%	0%	100%
10 02 12	5	41%	0%	100%	18 01 06*	9	80%	33%	100%
10 02 13*	5	25%	0%	91%	18 01 07	9	20%	0%	67%
10 02 14	5	75%	9%	100%	18 02 01	9	11%	0%	96%
10 03 15*	8	10%	0%	52%	18 02 02*	9	89%	4%	100%
10 03 16	8	90%	48%	100%	18 02 05*	6	72%	5%	100%

LoW Code	N	Av	Min	Max	LoW Code	N	Av	Min	Max
10 03 19*	5	81%	8%	100%	18 02 06	6	28%	0%	95%
10 03 20	5	19%	0%	93%	18 02 07*	5	14%	0%	60%
10 03 21*	4	92%	86%	100%	18 02 08	5	86%	40%	100%
10 03 22	4	8%	0%	14%	19 01 13*	7	84%	0%	100%
10 03 23*	5	100%	98%	100%	19 01 14	7	16%	0%	100%
10 03 24	5	0%	0%	2%	19 02 08*	5	76%	0%	100%
10 03 25*	1	100%	100%	100%	19 02 09*	5	7%	0%	32%
10 03 26	1	0%	0%	0%	19 02 10	5	17%	0%	68%
10 03 27*	1	100%	100%	100%	19 03 04*	8	19%	0%	100%
10 03 28	1	0%	0%	0%	19 03 05	8	81%	0%	100%
10 09 05*	7	12%	0%	29%	19 07 02*	6	19%	0%	73%
10 09 06	7	88%	71%	100%	19 07 03	6	81%	27%	100%
10 09 07*	9	12%	0%	100%	19 10 05*	6	2%	0%	9%
10 09 08	9	88%	0%	100%	19 10 06	6	98%	91%	100%
10 09 09*	6	9%	0%	33%	19 12 06*	8	4%	0%	28%
10 09 10	6	91%	67%	100%	19 12 07	8	96%	72%	100%
10 09 11*	7	2%	0%	10%	19 12 11*	9	4%	0%	17%
10 09 12	7	98%	90%	100%	19 12 12	9	96%	83%	100%
10 09 15*	1	100%	100%	100%	19 13 01*	7	75%	20%	100%
10 09 16	1	0%	0%	0%	19 13 02	7	25%	0%	80%
10 10 07*	7	13%	0%	60%	19 13 03*	2	100%	####	100%
10 10 08	7	87%	40%	100%	19 13 04	2	0%	0%	0%
10 10 09*	6	26%	0%	100%	20 01 25	9	75%	7%	100%
10 10 10	6	74%	0%	100%	20 01 26*	9	25%	0%	93%
10 10 13*	4	98%	90%	100%	20 01 27*	9	76%	3%	100%
10 10 14	4	2%	0%	10%	20 01 28	9	24%	0%	97%
10 10 15*	1	100%	100%	100%	20 01 31*	6	22%	0%	88%
10 10 16	1	0%	0%	0%	20 01 32	6	78%	12%	100%
10 11 11*	10	2%	0%	19%	20 01 33*	9	85%	47%	100%
10 11 12	10	98%	81%	100%	20 01 34	9	15%	0%	53%
10 11 13*	7	26%	0%	69%	20 01 21*	9	39%	5%	93%
10 11 14	7	74%	31%	100%	20 01 23*	9	17%	0%	49%
10 13 12*	7	21%	0%	100%	20 01 35*	9	44%	7%	85%
10 13 13	7	79%	0%	100%	20 01 21*	9	23%	3%	92%
11 01 11*	9	92%	73%	100%	20 01 23*	9	9%	0%	32%
11 01 12	9	8%	0%	27%	20 01 35*	9	25%	2%	69%
11 01 13*	8	93%	65%	100%	20 01 36	9	44%	2%	91%
11 01 14	8	7%	0%	35%	20 01 37*	9	2%	0%	7%
11 02 05*	2	3%	0%	6%	20 01 38	9	98%	93%	100%

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ANNEX VII

Translation table from classification under Directive 67/548/EEC to classification under this Regulation

Annex VII includes a table to assist translation of a classification made for a substance or a mixture under Directive 67/548/EEC or Directive 1999/45/EC, respectively, into the corresponding classification under this Regulation. Whenever data for the substance or mixture are available, an evaluation and classification shall be done in accordance with articles 9-13.

1. TRANSLATION TABLE

The codes used are introduced in Table 1.1 and paragraph 1.1.2.2 of Annex VI.

Table 1.1

Translation between classification in accordance with Directive 67/548/EEC and this Regulation

Classification under Directive 67/548/EEC	Physical state of the substance when relevant	Classification under this Regulation		
		Hazard Class-and-Category	Hazard statement	Note
E; R2		No direct translation possible.		
E; R3		No *direct* translation possible. H242		
O; R7		Org. Perox. CD		
		Org. Perox. EF	H242	
O; R8	gas	Ox. Gas 1	H270	
O; R8	liquid, solid	No direct translation possible.		
O; R9	liquid	Ox. Liq. 1	H271	
O; R9	solid	Ox. Sol. 1	H271	
R10	liquid	No direct translation possible. Correct translation of R10, liquid is: - Flam. Liq. 1, H224 if flashpoint < 23 °C and initial boiling point < 35°C - Flam. Liq. 2, H225 if flashpoint < 23°C and initial boiling point > 35 °C Flam. Liq. 3, H226 if flashpoint > 23°C		
F; R11	liquid	No direct translation possible. Correct translation of F; R11, liquid is: - Flam. Liq. 1, H224 if initial boiling point < 35°C - Flam. Liq. 2, H225 if initial boiling point > 35°C		
F; R11	solid	No direct translation possible.		
F+; R12	gas	No direct translation possible. Correct translation of F+; R12, gaseous results either in Flam. Gas 1, H220 or Flam. Gas 2, H221.		
F+; R12	liquid	Flam. Liq. 1	H224	
F+; R12	liquid	Self-react. CD	H242	
		Self-react. EF	H242	
		Self-react. G	none	
F; R15		No translation possible.		
F; R17	liquid	Pyr. Liq. 1	H250	

Classification under Directive 67/548/EEC	Physical state of the substance when relevant	Classification under this Regulation		
		Hazard Class-and-Category	Hazard statement	Note
F; R17	solid	Pyr. Sol. 1	H250	
Xn; R20	gas	Acute Tox. 4	H332	(1)
Xn; R20	vapours	Acute Tox. 4	H332	(1)
Xn; R20	dust/mist	Acute Tox. 4	H332	
Xn; R21		Acute Tox. 4	H312	(1)
Xn; R22		Acute Tox. 4	H302	(1)
T; R23	gas	Acute Tox. 3	H331	(1)
T; R23	vapour	Acute Tox. 2	H330	
T; R23	dust/mist	Acute Tox. 3	H331	(1)
T; R24		Acute Tox. 3	H311	(1)
T; R25		Acute Tox. 3	H301	(1)
T+; R26	gas	Acute Tox. 2	H330	(1)
T+; R26	vapour	Acute Tox. 1	H330	
T+; R26	dust/mist	Acute Tox. 2	H330	(1)
T+; R27		Acute Tox. 1	H310	
T+; R28		Acute Tox. 2	H300	(1)
R33		STOT Rep. 2	H373	(3)
C; R34		Skin Con. 1B	H314	(2)
C; R35		Skin Corr. IA	H314	
Xi; R36		Eye Irrit. 2	H319	
Xi; R37		STOT Single 3	H335	
Xi; R38		Skin Init. 2	H315	
T; R39/23		STOT Single 1	H370	(3)
T; R39/24		STOT Single 1	H370	(3)
T; R39/25		STOT Single 1	H370	(3)
T+; R39/26		STOT Single 1	H370	(3)
T+; R39/27		STOT Single 1	H370	(3)
T+; R39/28		STOT Single 1	H370	(3)
Xi; R41		Eye Dam. 1	H318	
R42		Resp. Sens. 1	H334	
R43		Skin Sens. 1	H317	
Xn; R48/20		STOT Rep. 2	H373	(3)
Xn; R48/21		STOT Rep. 2	H373	(3)
Xn; R48/22		STOT Rep. 2	H373	(3)
T; R48/23		STOT Rep. 1	H372	(3)
T; R48/24		STOT Rep. 1	H372	(3)
T; R48/25		STOT Rep. 1	H372	(3)
R64		Lact.	H362	
Xn; R65		Asp. Tox. 1	H304	
R67		STOT Single 3	H336	
Xn; R68/20		STOT Single 2	H371	(3)
Xn; R68/21		STOT Single 2	H371	(3)
Xn; R68/22		STOT Single 2	H371	(3)
Carc. Cat. 1; R45		Carc. IA	H350	
Carc. Cat. 2; R45		Carc. 1B	H350	
Carc. Cat. 1; R49		Carc. IA	H350i	
Carc. Cat. 2; R49		Carc. IB	H350i	
Carc. Cat. 3; R40		Carc. 2	H351	
Muta. Cat. 2; R46		Muta. 1B	H340	
Muta. Cat. 3; R68		Muta. 2	H341	
Repr. Cat. 1; R60		Repr. IA	H360F	(4)
Repr. Cat. 2; R60		Repr. 1B	H360F	(4)
Repr. Cat. 1; R61		Repr. IA	H360D	(4)
Repr. Cat. 2; R61		Repr. 1B	H360D	(4)
Repr. Cat. 3; R62		Repr. 2	H361f	(4)
Repr. Cat. 3; R63		Repr. 2	H361d	(4)
Repr. Cat. 1; R60 - 61		Repr. IA	H360FD	
Repr. Cat. 1; R60 Repr. Cat. 2; R61		Repr. IA	H360FD	

Classification under Directive 67/548/EEC	Physical state of the substance when relevant	Classification under this Regulation		Note
		Hazard Class-and-Category	Hazard statement	
Repr. Cat. 2; R60 Repr. Cat. 1; R61		Repr. IA	H360FD	
Repr. Cat. 2; R60 — 61		Repr. 1B	H360FD	
Repr. Cat. 3; R62 — 63		Repr. 2	H361fd	
Repr. Cat. 1; R60 Repr. Cat. 3; R63		Repr. IA	H360Fd	
Repr. Cat. 2; R60 Repr. Cat. 3; R63		Repr. 1B	H360Fd	
Repr. Cat. 1; R61 Repr. Cat. 3; R62		Repr. IA	H360Df	
Repr. Cat. 2; R61 Repr. Cat. 3; R62		Repr. 1B	H360Df	
N; R50		Aquatic. Acute	H400	
N; R50-53		Aquatic Acute 1 Aquatic Chronic 1	H400 H410	
N; R51-53		Aquatic Chronic 2	H411	
R52-53		Aquatic Chronic 3	H412	
R53		Aquatic Chronic 4	H413	
N; R59		Ozone	EUH059	

Note 1

For these classes it is possible to use the recommended minimum classification as defined in Paragraph 1.2.1.1 in Annex VI. Data or other information may be available to indicate that reclassification in a more severe category is appropriate.

Note 2

It is recommended to classify in Category 1B even if it also could be possible that 1C could be applicable for certain cases. Going back to original data, may not result in a possibility to distinguish between Category 1B or 1C, since the exposure period has normally been up to 4 hours according to Commission Regulation .... However, for the future, when data are derived from tests following a sequential approach as foreseen in the Commission Regulation ..., Category 1C should be considered.

Note 3

The route of exposure could be added to the hazard statement if it is conclusively proven that no other routes of exposure cause the hazard.

Note 4

Hazard statements 11360 and 11361 indicate a general concern for both the reproductive properties related to fertility and developmental effects; "May damage/Suspected of damaging impaired fertility or risk of harm to unborn child". According to the classification criteria (Annex I, 3.7) the general hazard statement can be replaced by the hazard statement indicating only the property of concern, in case either fertility or developmental effects are proven to be not relevant.

T a b l e 1 . 2
Translation between risk phrases assigned under Directive 67/548/EEC and supplementary labelling requirements under this Regulation

R1	EUH001
R6	EUH006
R14	EUH014
R18	EUH018
R19	EUH019
R44	EUH044
R29	EUH029
R31	EUH031
R32	EUH032
R66	EUH066
R39-41	EUH070