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ASSESSING LEGAL COMPLIANCE WITH AND IMPLEMENTATION OF THE WASTE ACCEPTANCE CRITERIA AND PROCEDURES BY THE EU-15

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1 Background and objectives

About 30 years ago, the first legislation in the field of environmental policy including waste policy came into force. In the context of increasing awareness of negative environmental and health impacts of anthropogenic activities, the environmental policy established key areas to be covered in legislation. Since then a large number of legal obligations have been set in order to limit or better reduce the negative impacts and to protect the environment and human health.

One of the most prominent policy areas in this respect is waste policy, due to the grave environmental and social impacts it may entail. In consequence, corresponding European Legislation sets standards for the handling, transport, treatment and disposal of waste for the purpose of reducing the negative effects to human health and to the environment. Therefore, Member States shall take appropriate measures for implementation and practical enforcement including the establishment of the necessary administrative and technical infrastructure, permitting, operation procedures, monitoring and effective control.

The **Waste Framework Directive 2008/98/EC (former 2006/12/EC)** sets the legal framework and basic definitions, relevant for waste management. Priority within the European waste hierarchy is given to prevent waste generation. Reuse, recycling and recovery options should be realised whenever suitable in order to reduce the consumption of primary resources and the amount of waste. However, a huge amount of waste is currently landfilled.

Concerning the disposal of waste in landfills, the **Directive 1999/31/EC on the landfill of waste** and the **Decision 2003/33/EC** on acceptance criteria set standards for the authorisation, design, operation, closure and aftercare of landfills.

First, the Landfill Directive had to be applied for new landfills only, and since July 2009 even existing landfills have to fully comply with the set requirements. Inter alia, landfills have to establish the provisions related to waste characterisation and the acceptance of waste in different landfill categories as defined in Annex II to the Landfill Directive.

The acceptance criteria and the acceptance process are further specified in **Council Decision 2003/33/EC** (hereinafter referred to as WAC Decision). This includes a detailed description of waste characterisation procedures, limit values for waste composition and leaching behaviour as well as acceptance procedures to be executed at each landfill site. The decision entered into force on 16 July 2004 and the limit values have to be applied in all Member States since 16 July 2005.

Within the last years, important efforts have been taken in order to meet the recently established legal requirements. However, infringement cases, complains and petitions received by the European Commission show, that there are deficits in implementation. Especially the practical enforcement of the WAC Decision raises difficulties for the involved stakeholders. Therefore, the project aims to monitor the state of implementation of the Landfill Directive (Annex II) and the WAC Decision. In this context – and in order to prevent infringement cases – high priority is given on close cooperation with Member State authorities and affected stakeholders to facilitate correct application of the EU waste legislation.

Within this project, the implementation of EU requirements by national legislation and the compliance on the ground with the provisions of the WAC Decision is analysed for each MS.

In addition, MS specific problems shall be identified to enable the European Commission to further investigate and, if necessary, to act appropriately to enable and achieve implementation.

In particular, the following tasks have been accomplished within the project:

- Assessment of legal compliance of the EU-15 Member States as regards Annex II to the Landfill Directive and the WAC Decision;
- Site visits to three representative landfills in DE, FR, IT, ES, GR, UK, IE;
- Site visits to one representative landfill in BE, DK, FI, LU, NL, AT, PT, SE;
- Country reports comprising aspects from the legal analysis and the landfill visits.

Project results will be presented to all competent MS representatives during a TAC meeting in Brussels scheduled for 13 November 2009.

2 Methodology and project approach

In this chapter, the conceptualised methodological approach is explained shortly. As the project concentrates on the assessment of the level of implementation and compliance with the WAC Decision in each Member State, a legal analysis of national legislation was realised as a first step. In addition the daily practice in the Member States has been evaluated in a second step as additional indicator for practical implementation of EU requirements.

Methodology for assessment of legal compliance

As illustrated in Figure 2-1, the legal analysis (WP 1) is a successive approach method to identify key elements of the WAC Decision and to develop a standardised control scheme.

Identification of key elements

In the first step, key elements of the WAC Decision have been identified within a developed and standardised control concept.

Afterwards, the relevant legal documents have been collected and accordingly analysed.

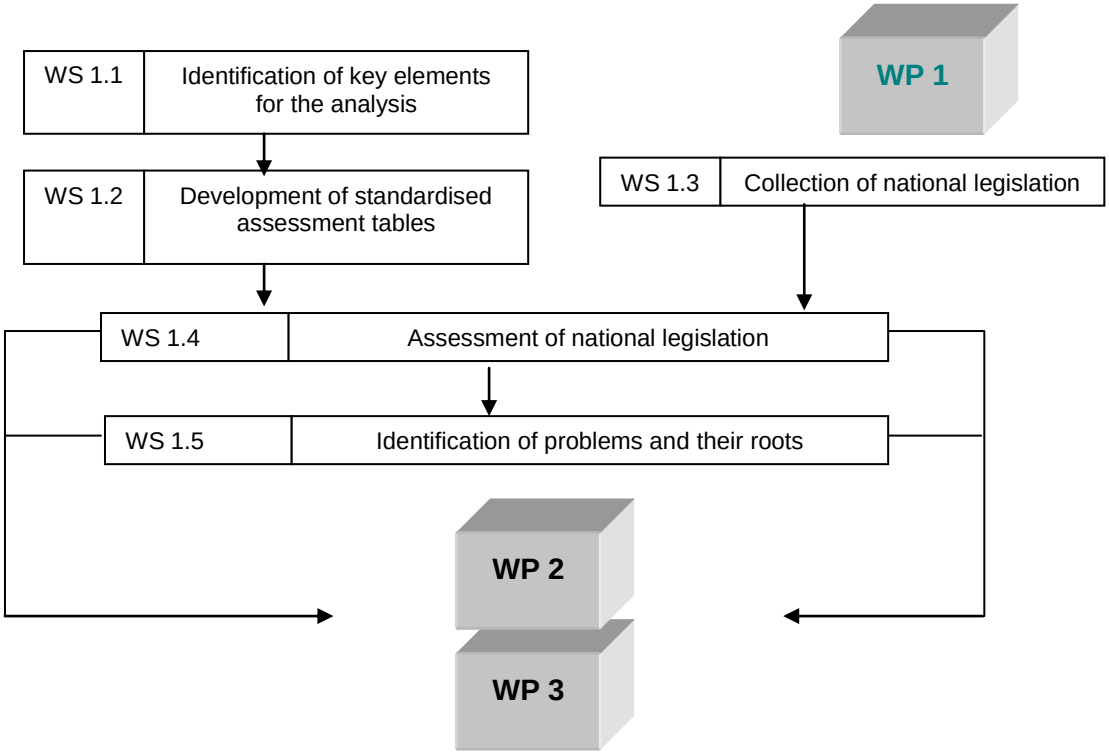

Figure 2-1: Methodology for legal analysis

The identification of key elements for the legal analysis is based on a thorough step-by-step examination of Annex II to the Landfill Directive and the WAC Decision to extract all relevant aspects for the evaluation. The key elements are allocated to the categories: basic characterisation, compliance testing and on-site verification comprising waste acceptance criteria for landfills for inert waste, criteria for landfills for non- hazardous waste, as well as sampling and analysis.

Standardised evaluation procedure

The evaluation procedure was realised in two steps and designed in a way to systematically compare each paragraph of the WAC Decision with the national legislation (see Figure 2-2). The detailed evaluation template is provided in the Annex, (table 2-1: "Standardised table for the assessment of implementation"). This standardised approach is helpful to ensure that the assessments are comparable and that all aspects are taken into consideration for each MS. The assessment tables comprise the information on the corresponding paragraph of the relevant national legislation and the analysing results. A short description of the text and especially of divergent aspects is added in short remarks for each MS. Additionally, aspects implemented by national legislation are listed. Furthermore, the table indicates if a Member State has not established specific rules related to a certain category of the EU legislation.

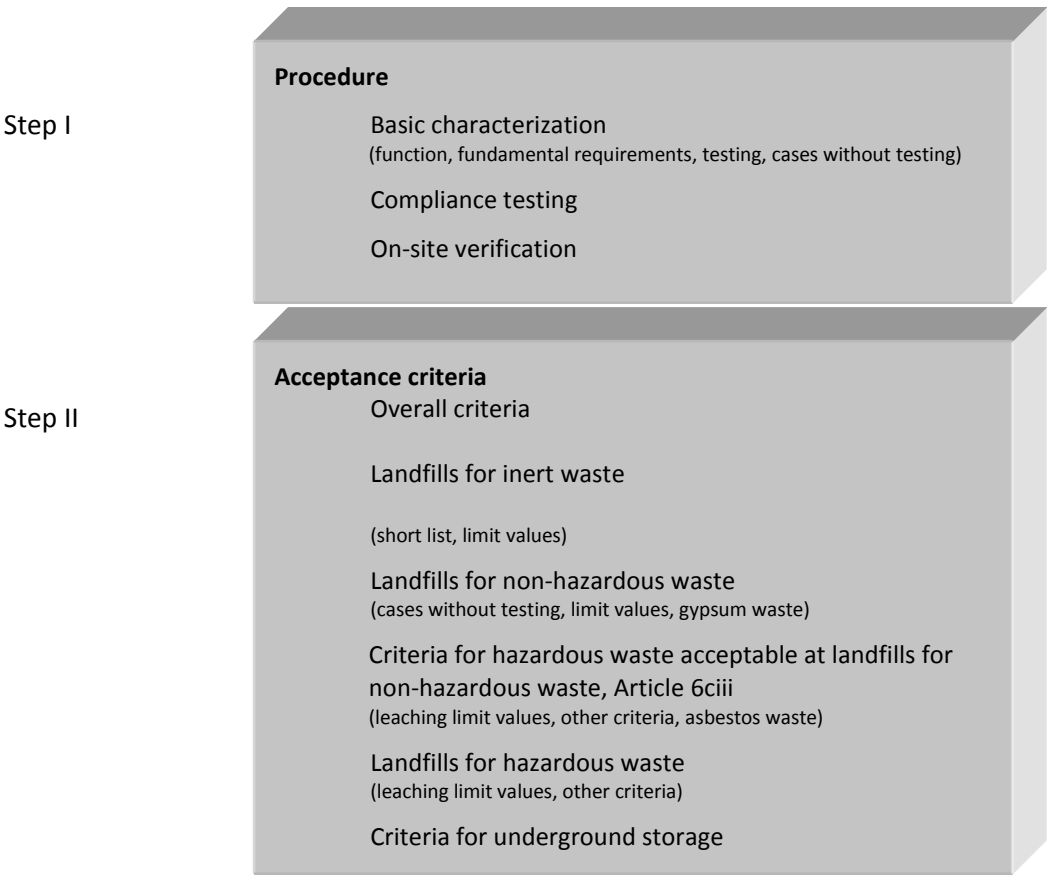

Figure 2-2: Evaluation scheme for assessment of legal compliance

Assessment of national legislation

The legal assessment was realised by means of the standardised and above described assessment form. Additionally, the assessment includes a summary table comparing the individual results of Member States (see Annex). Therefore, MS are allocated to categories depending on their individual national legislation to evaluate consistency and to identify divergences.

The implementation level of the WAC Decision in all countries is categorised according to the following scheme:

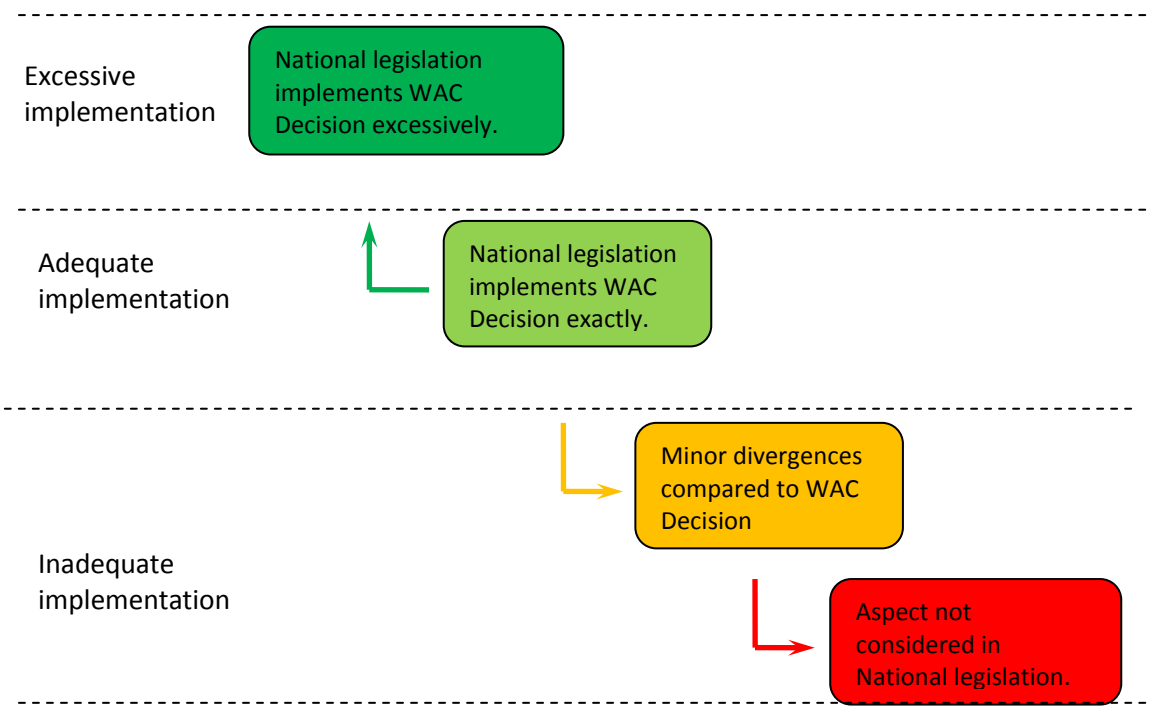

Figure 2-3: Assessment criteria for the national legislation

In case of divergences, it was checked whether specific local implementation difficulties exist or if procedures from other Member States could be adopted.

To characterise the implementation, the following symbols were used to indicate the quality of implementation for each key parameter:

- More stringent requirements
- Full implementation
- Deficit/divergence with minor impact
- Not implemented

+
✓
~
–

Methodology for information collection, cooperation and reporting

The collection of national legislation documents was realised by using archived materials (e.g. from previous projects as awareness raising seminars on waste legislation in several MS), by contacting representatives of national competent authorities, by requesting the relevant national legislation and by gathering corresponding information via internet.

Competent authorities for data collection

In order to prepare an assessment of legal compliance and country visits, the competent expert in the national authority of each EU-15 Member State has been identified as primary cooperation partner (see Annex III). All experts indicated in the list have been contacted by mid of December 2008 with a general questionnaire (see Annex III). The first e-mail and the attached questionnaire were intended to shortly introduce the issue and to get an expert opinion on the relevant legislation as a means to well target the investigation and the assessment. Depending on the administrative infrastructure of MS additional authorities, associations, companies and landfill operators have then been contacted on suggestion of the primary contact person. After a first evaluation of legislation and subordinated documents expert interviews have been performed to clarify open questions and to discuss details of provisions on national level. In Greece and Italy data collection, legal analysis and site visits have been performed by local subcontractors.

Site visits

The preparation of the site visits was performed in an incremental approach (see below) with the competent Member State authorities as the principal cooperation partners. Whenever possible, the project team organised the selection of representative landfills together with the identified contact persons of the competent authorities. In addition national waste management associations showed to be competent cooperation partners in some of the Member States.

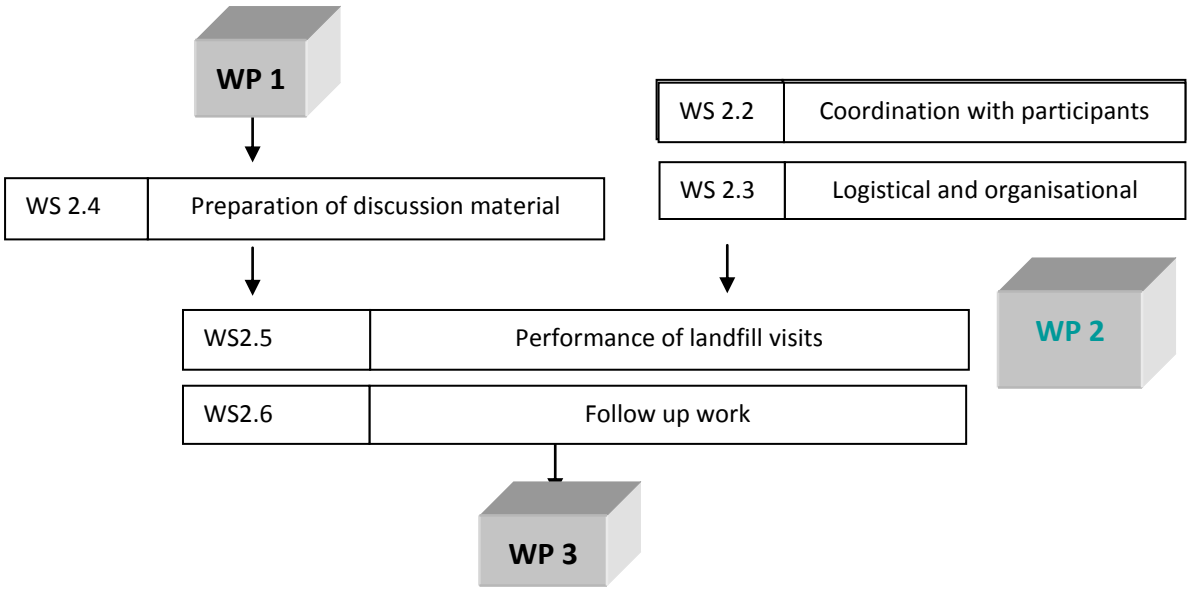

Figure 2-4: Working steps for landfills site visits and compliance check

In general, national authorities were invited to participate in site visits and meetings with the competent contact persons were organised when possible. In practice however, participation of national authorities in the majority of countries focussed on comments to the legal assessment performed, telephone and e-mail conversation and support for contacts with landfill operators.

The site visits included the preparation of supportive discussion material based on the legal analysis of the Member States (WP 1). This assessment was already finalised before visiting selected landfills and representatives of national competent authorities, in order to prepare specific questions.

During the site visits, a special focus was put on practical enforcement of the legal requirements (e.g. documentation of the basic characterisation, the methods and schemes used for compliance testing and the on-site acceptance procedures including the visual control procedures (see Annex III)).

Site visits where arranged in a language regime that allowed effective communication of all participants. Languages used in practice were English, French, Spanish, Portuguese, German, Italian and Greek. The project team could provide the corresponding language competence.

Country reports, summary evaluation and recommendations

The country reports comprise the legal analysis and the experiences gained within the landfill visits. Country reports describe relevant national provisions and current practice in the visited landfills in detail and contain short summarising assessments of the state of legal implementation and practical application. Thus, they allow to compare different approaches taken, to justify certain divergences between national law and EU legislation text and to identify examples of good practice either in legislation or in daily practice.

Country reports form the basis for the summary evaluation and assessment of the state of implementation in EU-15 and are compiled as Annex to this report. Prior to inclusion into this report each summary of site visits and each country report was send to involved national cooperation partners for comments and approval and suggestions have been incorporated to the extend possible.

Recommendations are based on the comparative overview table related to the state of implementation as well as a compilation of major deficits derived from the individual country reports. In addition, they are based on identified good practice examples.

Cooperation with related IMPEL project

In the preparation of site visits and data collection the project team did cooperate with the project leader of the IMPEL cluster 1 harmonisation project, in order to coordinate the questions and topics, to address and to avoid double visits at one treatment site. Furthermore, it was agreed that a number of questions relevant for the IMPEL project were addressed to involved stakeholders and discussed during expert interviews and site visits as far as possible. On the other hand, the IMPEL report has been provided to the project team.

3 Summary evaluation of legal implementation and practical application

This chapter provides a condensed description of the state of implementation of WAC Decision requirements in the EU 15. This description is based on an in-depth analysis of relevant national legislation in force and other relevant subordinated documents and site visits to landfills in all Member States. Assessment of legal implementation and practical application is based on the key elements of the WAC Decision.

Hence the chapter is divided in a short presentation of key elements to take into consideration in the investigation, a legal analysis and an evaluation of site visits.

The legal assessment has been based on the documents provided by national authorities in response to a systematic request for relevant legislation and any additional document in place specifying waste management provisions apart from national/regional legislation by means of a short questionnaire and additional expert interviews. In case of identified "short-comings" national/regional authorities were contacted again to discuss the existence of possible other documents, specifying the missing information and draft country reports which formed the base for this summary evaluation, were disseminated to national authorities for comments.

The existence of additional documents such as guidelines, handbooks, circulars, etc has been mentioned in country reports and these documents have been included into the evaluation whenever possible and necessary to fill potential deficits and gaps. A full evaluation of any additional document not referred to in national legislation or not mentioned by Member State authorities as relevant was not performed, because such an overall European analysis would have exceeded the scope of this project.

3.1 Key elements of the WAC Decision

The assessment of the state of implementation of WAC Decision requirements by national law and current practice in the visited Member States was based on the key elements of the European Decision 2003/33/EC such as basic characterisation, compliance testing, on-site verification and acceptance criteria for the different landfill classes as compiled below.

Procedure for the acceptance of waste at landfills

Basic characterisation (function): The basic characterisation constitutes a full waste description for the purpose of a save disposal, which is necessary for all types of waste. The proceeding shall provide information on waste composition and its behaviour in the landfill. Furthermore, it shall allow an assessment of waste against limit values and a determination of key variables as well as the frequency for compliance testing. Depending on the basic characterisation, the waste is accepted at the according landfill class. The waste producer or, in default, the person responsible for its management, is in charge to ensure that the information is correct. The Member States shall define the period for the operator to keep records of the required information.

Fundamental requirement for basic characterisation: This section lists the information necessary to fulfil the basic characterisation. Inter alia, it comprises information on the waste production, composition, appearance, source and origin of the waste.

Testing: Testing requirements are a crucial element of basic characterisation, which can be regarded as a general obligation for each type of waste. The content of the characterisation, the extent of laboratory testing and the relationship between basic characterisation and compliance checking depends on the type of waste generation. It is differentiated in regularly and not regularly generated wastes.

Cases where testing is not required: This section defines the cases where testing of the waste is not required.

Compliance testing: Compliance testing has to be done periodically (at least once a year) to check regularly arising waste streams. The relevant parameters to be tested are determined in the basic characterisation. Compliance testing shall at least consist of a batch leaching test and shall correspond to some of those used for basic characterisation. Member States shall define the period for the operator to keep records of the required information.

On-site Verification: Each load of waste delivered to a landfill site shall be visually inspected before and after unloading. Additionally, the required documentation shall be checked. Member States shall determine the testing requirements for on-site verification, and where appropriate rapid test methods. Furthermore, MS to determine the period for sample keeping.

Infobox 3-1: WAC Decision key elements are regards acceptance procedures

Waste Acceptance Criteria

In general, Member States shall define criteria for compliance with limit values set.

Criteria for landfills for inert waste: Criteria for inert waste landfills include a list of wastes accepted without testing, leaching limit values and limit values for the total content of organic waste. Guidance is provided with respect to criteria to comply with limits set. Member States shall determine which of the test methods and limit values shall be used. In addition, they shall set limit values for PAHs.

Criteria for landfills for non-hazardous waste: This section contains the possibility to create subcategories of landfill for non-hazardous waste and set limit values. In addition, it specifies the types of waste acceptable without testing and the procedures required in this case. Besides, it sets limit values for non-hazardous waste accepted in the same cells like stable non-reactive hazardous waste. Member States are requested to decide about the methods used for determination and the criteria applied for monolithic waste. Furthermore, restrictions and procedures are defined for gypsum waste.

Criteria for hazardous waste acceptable at landfills for non-hazardous waste: This element contains the definition of stable, non-reactive waste, leaching limit values for granular hazardous waste acceptable at landfills for non-hazardous waste and other criteria such as the content in TOC, pH and ANC. Member States shall determine which of the test methods and limit values shall be used. In addition, they shall set criteria for monolithic waste to provide the same level of environmental protection, criteria to ensure sufficient physical stability and bearing capacity and criteria to ensure that monolithic wastes are stable and non-reactive. Furthermore, specific procedures and requirements are set for asbestos waste.

Criteria for waste acceptable at landfills for hazardous waste: Criteria set comprise leaching limits for granular waste and limits for LOI, TOC and ANC. This includes guidance for measurement and procedures in case certain limits are exceeded. Member States shall determine which of the test methods and limit values shall be used and shall set criteria for monolithic waste to provide the same level of environmental protection.

Criteria for underground storage: The major acceptance criterion for underground storage is the site specific safety assessment as specified in Annex A. This safety assessment has to prove the long-term isolation of the wastes from the biosphere, taking into account e.g. local geological, geo-mechanical and hydro-geological conditions during the operational and post-operational phase. In addition, quite a number of wastes have to be excluded from underground storage due to associated risks. MS may issue lists of wastes acceptable. The set criteria have to be fulfilled by wastes under storage conditions. Furthermore, procedural requirements such as secure separation from mining activities, classification in groups of compatibility etc. have to be considered and addressed. There are specific regulations for salt mines and hard rock formations. The limit values and criteria set in the corresponding landfill chapters (see above) have to be met at underground storage sites for inert and non-hazardous waste. The compatibility with the safety assessment is the key criterion for underground storage sites for hazardous waste. If compatible, acceptance criteria for hazardous waste landfills do not apply. However, the waste must be subject to acceptance procedures including basic characterisation, compliance testing and on-site verification.

Infobox 3-2: WAC Decision key elements are regards acceptance criteria

Sampling and test methods: Sampling and testing may only be carried out by independent and qualified experts. Laboratories have to prove experience and efficient quality assurance systems. In this context, MS can decide upon the responsibility by selecting one of the two options. Furthermore, MS are obliged to draw up sampling plans for basic characterisation, compliance testing and on-site verification pursuant to the recently developed CEN sampling standard. Besides this, the methods set out in the decision have to be used in general. As long as formal CEN standards are not available; however, MS are allowed to use either national procedures and standards or the draft CEN standard when this has reached the prEN stage. Tests and analyses for which CEN standards are not yet available have to be approved by the competent authority

Infobox 3-3: WAC Decision key elements are regards sampling and testing standards

In order to be able to gather appropriate information and to standardise and facilitate data collection, all specific parameters and aspects discussed in 2003/33/EC under these topics, have been compiled in a list as basis for the assessment of the actual level of implementation (see Annex III).

3.2 Overview of WAC Decision implementation by national legislation

The evaluation of the compliance of national provisions with the WAC Decision shows two clear categories of implementation level:

Category 1: The WAC Decision requirements are not yet implemented by specific national legislation, but implementation is restricted to referral to article 16 and Annex II to the Landfill Directive or directly to the WAC Decision.

Category 1 comprises the Walloon Region in Belgium, Ireland, Greece and Spain.

Competent authorities in the concerned Member States argue that such referral assures compliance with EU requirements, in terms of a directly applicable WAC Decision. It however, has to be noted that in these cases all decisions mandated to Member States in the WAC Decision are not put into place, so that a full implementation status cannot be attributed to these countries.

Results in category one however, have to be further differentiated. In Belgium (Walloon Region) and Spain legislation to implement the WAC Decision is currently prepared but final elaboration and ratification is retarded due to complex administrative structures. On the other hand no such efforts are ongoing as far as known at the moment in Greece.

Note: the implementation of the WAC Decision requirements in Walloon regional legislation will be almost complete, as soon as the draft ordinance has passed the ratification procedure, the single remaining deficit identified is a missing obligation to determine the ANC.

Category 2: The WAC Decision has been transposed into national legislation, with several minor or more important differences as concerns specific details

Category 2 comprises the other Member States, which dispose of national legislation transposing the WAC Decision. However, also in this group of countries in several cases certain specific aspects of the WAC Decision are not fully adopted.

The following tables provide an overview of the status of implementation of WAC Decision requirements by national legislation of the EU-15 according to the explanation in chapter 2.

Implementation of the Decision 2003/33/EC																			
	Austria	Belgium Brussels	Belgium Flanders	Belgium Wallonia	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Luxembourg	Netherlands	Portugal	Spain	Sweden	UK England/Wales	UK Northern Ireland	UK Scotland
1. Acceptance Procedures																			
1.1 Basic characterisation																			
1.1.1 Function of basic characterisation																			
1.1.2 Fundamental requirements for basic characterisation of the waste																			
1.1.3 Testing																			
1.1.4. Cases where testing is not required																			
1.2 Compliance testing																			
1.3 On site verification																			

Table 3-1: Overview of implementation of 2003/33/EC procedures in Member State legislation (EU 15) in 2009

Bright green = identical, dark green = more stringent; amber = slight differences; red = not covered

As illustrated in the table above, implementation of EU requirements related to acceptance procedures is largely achieved in the majority of EU-15 Member States. Often the WAC Decision wording is even literally transposed into national legislation.

Minor divergences occur in several cases in the context of fundamental requirements of basic characterisation (certain points not mentioned), of compliance testing (specification of frequency, number of substances to test, specification on application of leaching test) and of on-site verification (visual inspection or sampling/testing obligation). For further details see chapter 3.2.1.

As regards acceptance criteria, implementation by national legislation is also achieved in the majority of EU 15 Member States (see Table 3-3).

Implementation of the Decision 2003/33/EC	Austria	Belgium Brussels	Belgium Flanders	Belgium Wallonia	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Luxembourg	Netherlands	Portugal	Spain	Sweden	UK England/Wales	UK Northern Ireland	UK Scotland
2. Acceptance Criteria																			
2.1 Criteria for landfills for inert waste																			
2.1.1 List of wastes acceptable at landfills for inert waste without testing																			
2.1.2 Limit values for waste acceptable at landfills for inert waste																			
2.1.2.1 Leaching limit values																			
2.1.2.2 Limit values for total content of organic parameters																			
2.2 Criteria for landfills for non-hazardous waste																			
2.2.1 Waste acceptable at landfills for non-hazardous waste without testing																			
2.2.2 Limit values for non-hazardous waste co-disposed with stable non reactive hazardous waste																			
2.2.3 Gypsum waste																			
2.3 Criteria for hazardous waste acceptable at landfills for non hazardous waste, Art 6 c iii																			
2.3.1 Leaching limit values																			
2.3.2 Other criteria																			
2.3.3 Asbestos waste																			
2.4. Criteria of waste acceptable at landfills for hazardous waste																			
2.4.1 Leaching limit values																			
2.4.2 Other criteria																			
2.5 Criteria for underground storage																			

Table 3-2: Overview of implementation of 2003/33/EC acceptance criteria in Member State legislation (EU 15) in 2009

Bright green = identical, dark green = more stringent; amber = slight differences (might also comprise a combination of stricter regulation and specific divergence) or no existing specific legislation in place; red = not covered

As illustrated in the table above, implementation of EU requirements related to acceptance criteria are achieved in the majority of EU 15 Member States, with the WAC Decision wording in many cases being fully transposed into national legislation. But the number of divergences is larger than for the basic procedural principles.

This comprises both certain deficits in adoption of EU requirements (fields marked in amber) and more stringent requirements at national level (fields marked in dark green).

It has to be noted that amber fields might comprise a combination of stricter requirements and minor deficits. Hence assessment in this case has to be made with care.

Major aspects which tend to be not addressed in national legislation are as follows:

- Criteria for monolithic waste and the warranty that the monolithic waste has the same level of environmental protection as given for granular waste. In many cases a separation of waste into granular and monolithic waste is not specified by national legislation;
- Criteria for stability and non-reactivity of hazardous waste to be landfilled on a class B landfill;
- Criteria for physical stability and bearing capacity of waste.

On the other hand EU 15 Member States tend to set additional or divergent national provisions as regards:

- exceedance of limit values (additional possibilities, further restrictions);
- subcategories of class B landfills;
- leaching and organic content limits (additional substances, more or less stringent);
- list of inert wastes exempted from testing;
- list of wastes for non-hazardous waste landfills;
- gypsum and asbestos waste management.

As regards sampling and testing a number of Member States has defined a wide variety of standards, and several groups of national/regional standards are dominating in Member State lists.

For more details see chapter 3.2.1.

3.2.1 Detailed evaluation of state of implementation with respect to Acceptance Procedures

In the following, an overview of the implementation of the WAC Decision by national legislation and relevant divergences of the requested implementation is given. Hence, the different sections of the Annex to the WAC Decision are represented and in order to differentiate between overall results and MS specific divergences these are listed in detail.

3.2.1.1 Function of basic characterisation

According to the WAC Decision (see wording below) the basic characterisation shall provide all information necessary to assess the acceptability of a specific waste at the certain landfill class by means of written information and chemical analysis if relevant. In addition, it shall be used to determine critical parameter and frequency of compliance testing and the waste producer shall be responsible and the operator shall keep a record for a certain period.

…
(a) **Basic information on the waste** (type and origin, composition, consistency, leachability and — where necessary and available — other characteristic properties)
(b) **Basic information for understanding the behaviour of waste in landfills** and options for treatment as laid out in Article 6(a) of the Landfill Directive
(c) Assessing waste against limit values
(d) **Detection of key variables** (critical parameters) for compliance testing and options for simplification of compliance testing (leading to a significant decrease of constituents to be measured, but only after demonstration of relevant information).
Characterisation may deliver ratios between basic characterisation and results of simplified test procedures as well as frequency for compliance testing.
If the basic characterisation of waste shows that the waste fulfils the criteria for a landfill class as laid down in section 2 of this Annex, the waste is deemed to be acceptable at this landfill class. If this is not the case, the waste is not acceptable at this landfill class.
The producer of the waste or, in default, the person responsible for its management, is **responsible** for ensuring that the characterisation information is correct.
The operator shall **keep records** of the required information for a period to be defined by the Member State.

Infobox 3-4: Wording WAC Decision chapter 1.1.1

Based on the evaluation of national legislation it can be stated that the wording of the WAC Decision concerning function of basic characterisation is normally fully adopted, if the WAC Decision is implemented by a national legislation[1]. In Greece and Germany the wording chosen is slightly different but the intention and objective of EU legislation is met. This comprises the determination of key variables and the frequency of compliance testing. The responsibility for basic characterisation is always allocated to the waste producer.

The obligation for record keeping is always set. The period for record keeping normally ranges from 1-10 years but can be till the end of the aftercare phase. In Irish legislation a time for record keeping is not set.

Examples of good practice:

- Legislation requests that all information related to basic characterisation has to be documented in the operation journal of the landfill until the end of the after-care period (e.g. DE, FR);

- Basic characterisation has to be repeated after a certain period (annually e.g. FR, IT, every eight years e.g. AT, etc).

3.2.1.2 Fundamental requirements for basic characterisation of the waste

The WAC Decision specifies in detail the information that shall be provided for the basic characterisation, as presented below:

[1] Not mentionned in current legislation in BE Wallonia, ES.

…
(a) Source and origin of the waste
(b) Information on the process producing the waste (description and characteristics of raw materials and products)
(c) Description of the waste treatment applied in compliance with Article 6(a) of the Landfill Directive, or a statement of reasons why such treatment is not considered necessary
(d) Data on the composition of the waste and the leaching behaviour, where relevant
(e) Appearance of the waste (smell, colour, physical form)
(f) Code according to the European waste list (Commission Decision 2001/118/EC) (1)
(g) For hazardous waste in case of mirror entries: the relevant hazard properties according to Annex III to Council Directive 91/689/EEC of 12 December 1991 on hazardous waste (2)
(h) Information to prove that the waste does not fall under the exclusions of Article 5(3) of the Landfill Directive
(i) The landfill class at which the waste maybe accepted
(j) If necessary, additional precautions to be taken at the landfill
(k) Check if the waste can be recycled or recovered

Infobox 3-5: Wording WAC Decision chapter 1.1.2

Most of the MS have fully adopted the text of the WAC Decision related to fundamental requirements for basic characterisation of the waste. In Germany, Ireland, the Netherlands and Spain a few requirements are not specifically addressed in national law which can be regarded as minor deficit.

Observed deficits:

- The topic is not covered in legislation in force in Greece;
- In Germany and the Netherlands certain aspects such as the obligation to provide information on the process producing the waste, necessary additional precautionary measures to be taken at the landfill, or the check if the waste can be recycled or recovered are not explicitly mentioned. According to German authorities such information however, is requested by other legislation and thus has not been repeated.
- In Spain certain but not all WAC Decision topics are covered by the wording of Real Decreto 1481/2001;

Examples of good practice:

- Legislation specifies documents and procedures that shall be used for basic characterisation (e.g. DE, FR);
- Legislation further specifies requirements related to WAC Decision para d) waste composition/leaching behaviour and the general obligation for testing by means of provisions for analysis results (sampling protocol, analysis report) to provide (e.g. DE);
- Legislation relates to/accepts documents requested for hazardous waste already by other legislation (e.g. DE).

3.2.1.3 Testing

The WAC Decision chapter on testing comprises quite complex and detailed provisions. This includes the general testing obligation and the obligation to provide chemical information about the waste composition as well as the differentiation between procedures for regularly generated and not regularly generated waste[2] with the requirement to focus on compositional range and variability of characteristic properties.

> As a general rule waste must be tested […]. In addition to the leaching behaviour, the composition of the waste must be known or determined by testing. The tests used for basic characterisation must always include those to be used for compliance testing.
> The content of the characterisation, the extent of laboratory testing required and the relationship between basic characterisation and compliance checking depends on the type of waste. A differentiation must be made between:
> (a) wastes that are regularly generated in the same process;
> (b) wastes that are not regularly generated.
> […]
> For [(a)]wastes the basic characterisation will comprise […] especially the following:
> — compositional range for the individual wastes,
> — range and variability of characteristic properties,
> — the leachability of the wastes determined by a batch leaching test and/or a percolation test and/or a pH dependence test,
> — key variables to be tested on a regular basis.
>
> If the waste is produced in the same process in different installations, information must be given on the scope of the evaluation. Consequently, a sufficient number of measurements must be taken to show the range and variability of the characteristic properties of the waste. […].
> For wastes from the same process in the same installation, the results of the measurements may show only minor variations of the properties of the waste in comparison with the appropriate limit values. The waste can then be considered characterised, […] unless significant changes in the generation process occur.
> Waste from facilities for the bulking or mixing of waste, from waste transfer stations or mixed waste streams from waste collectors, can vary considerably in their properties. This must be taken into consideration in the basic characterisation. Such wastes may fall under case (b).

Infobox 3-6: Wording WAC Decision chapter 1.1.3

In the majority of Member State all aspects of the WAC Decision chapter on testing requirements (namely the different procedures between regularly and not regularly generated wastes) are more or less literally transposed in national legislation.

In German, Italian and Dutch legislation the issue of regularly and not regularly generated waste is not discussed in particular, but legislation requests a demonstration of variability.

In Ireland the issue is restricted to a referral to Article 16 and Annex II of the Landfill Directive. In the UK the issue is not specifically mentioned in the interpretation “guidelines”, so that the wording of the WAC Decision can be expected to apply. In the Walloon Region current legislation does not specify testing requirements but explicitly refers to the WAC Decision as legislation to comply with.

[2] Including facilities for the bulking or mixing of waste, from waste transfer stations or mixed waste streams from waste collectors

German legislation in addition stipulates that the waste producer has to provide proposals for key parameter and frequency of compliance testing as well as a new basic characterisation in case of changes in the production process or in waste composition which can be regarded as implementation of at least chapter 1.1.3 a) WAC Decision.

Observed deficits:

Although the wording of the WAC Decision is largely adopted in most of the EU 15 Member States, it is not further specified how to determine the "compositional range and variability of characteristic properties".

In this context the obligation, to annually re-new the basic characterisation as requested in a number of Member States, could be regarded as practical mean to determine and assess the variability of regularly generated wastes.

Examples of good practice:

- Mandatory sampling procedures in order to generate reliable information on the compositional range of waste (number and location of samples related to amount, state and shape of waste batch) in German legislation;
- Sampling in individual intervals (depending on first analysis results) over a period of 12 months in order to reflect variability of time (AT);
- Sampling from five different batches in order to reflect variability (NL, AT).

3.2.1.4 Cases where testing is not required

The WAC Decision allows the exemption from the testing obligation in case of three different occasions as presented in the box below.

> Testing for basic characterisation can be dispensed with in the following cases:
> (a) the waste is on a list of wastes not requiring testing as laid down in section 2 of this Annex;
> (b) all the necessary information, for the basic characterisation, is known and duly justified to the full satisfaction of the competent authority;
> (c) certain waste types where testing is impractical or where appropriate testing procedures and acceptance criteria are unavailable. This must be justified and documented, including the reasons why the waste is deemed acceptable at this landfill class.

Infobox 3-7: Wording WAC Decision chapter 1.1.4

The three possibilities for exemptions provided for in the WAC Decision are more or less literally implemented by national legislation in most of the Member States.

The Netherlands further specify chapter 1.1.4 c) of the Decision by a general exclusion from testing requirements of waste particles (> 40mm) (see Dutch Legislation Article 10 a) § 2 d)). The exclusion is justified by the fact that sampling cannot take place in such a way that it will lead to a representative laboratory sample for the entire batch.

Observed deficits: none.

Examples of good practice:

- German legislation is more stringent in this aspect as it does not reflect section 1.1.4. c) WAC Decision in the national legislation. In contrary PN 98, which contains binding provisions for sampling specifies in detail the procedures for proper sampling of different particle sizes with separate analysis of waste fractions if needed.

3.2.1.5 Compliance testing

The WAC Decision shortly stipulates the function of compliance testing and its relation to basic characterisation with the possibility to restrict to key parameter and a batch leaching test. Further important aspects are the frequency, the record keeping and the fact that wastes exempted from testing in basic characterisation are also exempted form any other testing (compliance, on-site).

> When waste has been deemed acceptable […] it shall subsequently be subject to compliance testing to determine if it complies with the results of the basic characterisation and the relevant acceptance criteria […].
> The function of compliance testing is periodically to check regularly arising waste streams.
> The relevant parameters to be tested are determined in the basic characterisation. Parameters should be related to basic characterisation information; only a check on critical parameters (key variables), […] is necessary. The check has to show that the waste meets the limit values for the critical parameters.
> The tests used for compliance testing shall be one or more of those used in the basic characterisation.
> The testing shall consist at least of a batch leaching test. For this purpose the methods listed under section 3 shall be used.
> Wastes that are exempted from the testing requirements for basic characterisation […] are also exempted from compliance testing. They will, however, need checking for compliance with basic characterisation information other than testing.
> Compliance testing shall be carried out at least once a year and the operator must, in any event, ensure that compliance testing is carried out in the scope and frequency determined by basic characterisation.
> Records of the test results shall be kept for a period that will be determined by the Member State.

Infobox 3-8: Wording WAC Decision chapter 1.2

Member States in general adopt the wording of the WAC Decision in their national legislation. This comprises the possibility to restrict to key parameter and to a batch leaching test and the fact that wastes exempted from testing in basic characterisation are also exempted form any other testing.

The frequency for compliance testing in most cases is fixed to one year. Periods for record keeping are set in all Member States with legislation in place. They often depend on the type of landfill and waste and range from 1-10 years. In Germany the records have to be kept until the end of aftercare period.

Slight differences exist in Ireland, the Netherlands and Germany. They are considered to have no impacts on WAC Decision objectives and thus are not considered a lack of implementation but just a slightly different interpretation in accordance with EU requirements.

- In case of IE the difference restricts to the fact, that the time of record keeping of compliance tests is part of the landfill licensing provisions and not contained in the Waste Management Act itself;

- In NL the obligation to perform a batch leaching test for compliance testing is restricted to situations where leaching results have been identified as critical (key) parameter;

- In Germany the only difference in comparison to the WAC Decision is the fact that the function of compliance testing is not contained explicitly in the new legislation. This is explained by the mandatory sampling and testing regime for all wastes based on quantity and intervals (see PN 89) which automatically implies a compliance testing procedure for regularly arising wastes, without necessity to discuss the theory behind

Examples of good practice:

- No restriction to key parameter but full analysis of all substances defined for basic characterisation in national legislation (e.g. FR);

- Frequency of compliance testing (<1/year) related to waste characteristic and waste amounts (e.g. DE, AT);

- Spanish legislation in force requests an annual compliance testing or a testing every 200 tonnes.

3.2.1.6 On-site verification

As concerns on-site verification the focus of WAC Decision requirements is the control of required documentation and visual inspection. Periodic sampling is another key obligation.

In addition the decision allows verification at the point of departure in certain cases and requests MS to determine on-site testing requirements (see Infobox 3-9).

> Each load of waste delivered to a landfill shall be visually inspected before and after unloading.
> The required documentation shall be checked.
> For waste deposited by the waste producer at a landfill in his control, this verification may be made at the point of dispatch.
> The waste may be accepted at the landfill, if it is the same as that which has been subjected to basic characterisation and compliance testing and which is described in the accompanying documents. If this is not the case, the waste must not be accepted.
> Member States shall determine the testing requirements for on-site verification, including where appropriate rapid test methods.
> Upon delivery, samples shall be taken periodically. The samples taken shall be kept after acceptance of the waste for a period that will be determined by the Member State (not less than one month […].

Infobox 3-9: Wording WAC Decision chapter 1.3

On-site verification is the aspect of acceptance procedures where consistency with the WAC Decision text is least established. Six Member States have somewhat varied the provisions in their national

legislation. These differences do not affect the check of documentation, but focus on visual inspection, sampling and testing.

Observed deficits:

- German legislation contains the general obligation that the visual inspection generally has to take place at the entrance gate (before unloading). It can also take place at the place of unloading in justified cases. According to Danish legislation the competent (licensing) authority can reduce testing requirements for on-site verification for inert, mineral and hazardous waste and therefore the on-site verification can merely be a visual inspection. A period for sample keeping from sampling form the on-site verification is not set;
- In Finland - probably due to climatic considerations – visual inspection after unloading is only optional. In this context it has to be clarified how visual inspection before unloading is assured in practice. (According to expert information and it is much more complicated (closed/covered lorries) and of limited efficiency from the practical point of view.). In addition a period for sample storage is not defined in Finish legislation;
- In France the different laws in force for inert, non-hazardous waste and hazardous waste landfills contains slightly diverging provisions as concerns visual inspection and sampling/testing: For inert waste visual inspection is to be performed at the place of unloading, whilst on-site sampling and testing is not mentioned in the law. For non-hazardous waste on-site sampling is not requested. For hazardous waste visual inspection shall be performed before or after unloading;
- In Irish legislation a visual inspection before and after unloading is not mentioned;
- In NL, the visual inspection before unloading is interpreted as inspection of the documentation, so that the visual inspection after unloading remains as the only optical control performed;
- In Spain and Sweden the period of time for record keeping and/or the fact that samples have to be stored is not defined.

Assessment of observed deficits:

From the practical point of view the restriction of one visual inspection appears to be reasonable, due to the fact that most vehicles are closed and inspection before unloading would largely restrict to the top layers in case standardised collection vehicles are used and waste has undergone pre-treatment. In contrary, it would make sense in countries with low separation at source in order to sort out bulky waste, metals, green waste and WEEE at the landfill entry.

The lack of sampling and testing obligations is a more important deficit, which should be clarified and justified. No testing would be in accordance with WAC Decision requirements for exempted wastes (inert, MSW, testing impracticable), but not as regards other waste which in theory are acceptable at the landfill classes with testing. So far, there is no indication that Member States without sampling obligation or without definition of storage periods restrict waste acceptance exclusively to wastes on short lists or other exempted wastes.

In addition, it should be discussed and decided upon whether the WAC Decision sampling obligation in relates to analysis or whether it is an independent obligation to comply with.

Examples of good practice:

- Routine on-site sampling of each batch of hazardous waste delivered at a landfill including a quick test for all substances before landfilling (e.g. FR);
- Mandatory automated check for radioactivity of all waste loads delivered (e.g. FR);
- Standardised on-site sampling and analysis depending on waste quantities delivered (quantities defined by type of waste) such as requested (e.g. in DE, AT);
- The possibility to make the on-site verification at the point of dispatch in case of disposal of the waste at a facility controlled by the waste producer (WAC 1.3. second sentence) is not set (e.g. DE). Monthly on-site testing of mixed non-hazardous waste (e.g. DK).

3.2.2 Detailed evaluation of state of implementation with respect to Acceptance Criteria

The fast majority of EU 15 Member States implemented the WAC Decision requirements concerning the acceptance criteria. In general, the classification of the landfills is in line with the WAC Decision. In some countries additional subcategories for class B landfills have been defined.

Greece, Spain, the Walloon Region and IE referring to Annex II of the Landfill Directive and/or request compliance with the WAC Decision Requirements, currently do not further specify the aspects where Member State decision are requested by the WAC Decision.

As concerns acceptance criteria, divergences focus on leaching limit values and for the total content parameters for additional substances, more stringent or less stringent limit values for a number of substances, and on additional possibilities to accept higher contamination namely of TOC and DOC or additional restrictions.

3.2.2.1 Acceptability of higher limit values

Chapter 2 of the Annex to the WAC Decision (see Infobox 3-10) specifies the cases, where higher limits than those set in the Decision can be permitted, and where not and requests Member States to report about such permits.

In certain circumstances, up to three times higher limit values for specific parameters listed in this section […] are acceptable, if
— the competent authority gives a permit for specified wastes on a case-by-case basis for the recipient landfill,
taking into account the characteristics of the landfill and its surroundings, and
— emissions (including leachate) from the landfill, taking into account the limits for those specific parameters in this section, will present no additional risk to the environment according to a risk assessment.
Member States shall report to the Commission on the annual number of permits issued under this provision. […].
Member States shall define criteria for compliance with the limit values set out in this section.

Further limitations:
No possibility for exemption for:
- DOC in sections 2.1.2.1, 2.2.2, 2.3.1 and 2.4.1, (i.e. class A, B und C)
- BTEX, PCBs and mineral oil in section 2.1.2.2, (class A)
- TOC and pH in section 2.3.2 (class B in case of co-disposal)
- LOI and/or TOC in section 2.4.2 (class C)

Possible increase of the limit value for TOC in section 2.1.2.2 (class A) to only two times the limit value

Infobox 3-10: Wording WAC Decision chapter 2

Following the analysis of corresponding national legislation it can be stated, that most of the MS have fully implemented the WAC Decision provisions related to possibilities of higher limits and have incorporated provisions to establish registers about such permits in order to be able to report the information to the EU Commission.

However there are also some Member States (e.g. DE, DK, IT, NL, UK England/Wales and UK Northern Ireland, Scotland) which have defined additional limitations or additional possibilities for exemptions.

Observed deficits:

- There are some additional possibilities to exceed TOC limits for class C landfills, which are not foreseen in the WAC Decision. In this context it however has to be taken into account that these limits apply to inorganic carbon and residues from accidental fires or natural catastrophes as well as to wastes from excavation of old dumps or historical hot spots provided all combustible fraction shave been separated before. Disposal has to be performed in a separate cell (DE).
- Further possible exemptions have been set for non-hazardous waste, where EU provisions do not apply (DE, AT, PT, LU, etc).
- Criteria for the compliance with the limit values defined by the WAC Decision are not set in national legislation (IE);
- The corresponding analysing test methods are not legally obligatory as they are determined by EPA guidelines and therefore changeable (IE);

- TOC limits for co-disposal of stable non-reactive hazardous waste with non-hazardous waste do only apply for chemically active carbon and not for inorganic carbon such as polymers, resins and other non-biodegradable mixtures (IT);

- In the Brussels Capital Region the WAC Decision provisions and criteria to be set by Member States are not elaborated but referral is made to the Ministry of Environment as competent authority to set them in accordance with the WAC Decision. On the other hand, Brussels does not have any active landfill site since years.

Although in accordance with the WAC Decision is it nevertheless worthwhile to note that some Member States, e.g. France consistently use the TDS limit instead of chloride and sulphate, whereas a more stringent implementation is used in Denmark, which does not allow the TDS value to be used alternatively to the values for sulphate and chloride.

As concerns the obligation to document information on permitted exemptions, UK England/Wales has included an interpretation ("the third sentence of Section of the Annex to the WAC Decision has to be ignored") which could be interpreted as potential minor deficit and BE Flanders did not state such obligation in its regional legislation. Reporting on permits for exemptions is explicitly stated in national legislation in PT.

Examples of good practice:

- No permit for higher limit values for Cd, Hg and Pb (e.g., DK);
- The possibility to use TDS alternatively to chloride, sulphate is not given (e.g. DK);
- Legislation does not foresee the possibility to permit higher limit values for inert waste landfills (UK England/Wales);
- Limit values may not be exceeded for MBT residues, for which specific additional parameter are set (e.g. DE);
- If higher TOC values shall be authorised in case the DOC limit is met, a biodegradability limit (AT_4) a heating value limit and a limitation of higher TOC levels to a maximum of 6% by weight for soil (170504, 170506 and 200202) is requested as additional prerequisites for acceptance of higher values (e.g. DE);
- TOC limit values are generally more stringent than indicated by the WAC Decision and they apply to all types of waste disposed off at a certain landfill class including inert and non-hazardous waste (e.g. DE). For a permit of higher limit values at landfills in a coastal position a weighted dilution factor has to be calculated which has to be <1 (DK);
- Wastes destined for landfill class B landfills may not exceed an LOI of 3-5% and a TOC of 1-3% which is more stringent than the 5% for TOC in the WAC Decision (e.g. DE).

3.2.2.2 List of wastes acceptable at landfills for inert waste without testing

WAC Decision chapter 2.1.1 defines in detail under which conditions a number of wastes can be exempted from the testing obligation (see Infobox 3-11). Important features are the knowledge about the origin and the exclusion of a contamination with other substances.

Wastes on the […] short list […] can be admitted without testing at a landfill for inert waste.
The waste must be a single stream (only one source) of a single waste type.
Different wastes contained in the list maybe accepted together, provided they are from the same source.
In case of suspicion of contamination (either from visual inspection or from knowledge of the origin of the waste) testing should be applied or the waste refused.
If the listed wastes are contaminated or contain other material or substances such as metals, asbestos, plastics, chemicals, etc. to an extent which increases the risk associated with the waste sufficiently to justify their disposal in other classes of landfills, they may not be accepted in a landfill for inert waste.
If there is a doubt that the waste fulfils the definition of inert waste […] or about the lack of contamination […], testing must be applied. […]
Waste not appearing on this list must be subject to testing

Infobox 3-11: Wording WAC Decision chapter 2.1.1

WAC Decision short list and provisions:

1. Glass based fibres (101103) in case without organic binders
2. Glass (150107, 170202, 191205) and 200102 (if separately collected)
3. Concrete (170101), Bricks (170102), Tiles and ceramics (170103) and mixtures thereof (170107) in case the are:
   (*) Selected construction and demolition waste: with low contents of other types of materials (like metals, plastic, soil, organics, wood, rubber, etc). The origin of the waste must be known.
   — No C & D waste from constructions, polluted with inorganic or organic dangerous substances, e.g. because of production processes in the construction, soil pollution, storage and usage of pesticides or other dangerous substances, etc., unless it is made clear that the demolished construction was not significantly polluted.
   — No C & D waste from constructions, treated, covered or painted with materials, containing dangerous substances in significant amounts.
4. Soil and stones (170504) but excluding topsoil and peat and contaminated soil and (200202) if restricted to garden and park waste and excluding topsoil and peat.

Infobox 3-12: Wording WAC Decision chapter 2.1.1

In general, the acceptance criteria concerning waste to be disposed without testing at landfills for inert waste is fully implemented in the assessed national legislations. Only in some Member States divergences exist which represent both a more stringent acceptance of waste and a not fully compliant implementation of the WAC Decision requirements.

Observed deficits:

- The short list is not foreseen to be contained in the legislation but in a (non-legally binding) list of the EPA (e.g. DK)
- The EWC code 200102 (separately collected glass) is deleted and asbestos bound to inert material is included (e.g. FR);
- The shortlist is slightly extended to include also 010413 (waste from stone cutting) and 170904 (mixed C&D waste) and residues from crystal production under 101103. (IT)

Examples of good practice:

- All types of glass based wastes are deleted from the list (e.g. AT, LU)
- DK did not establish a short list of waste exempted from testing

3.2.2.3 Leaching limit values for inert waste

As concerns leaching limits for inert waste, the definition of the appropriate test method and the adoption of potential exemptions are the critical parameter for the correct implementation of WAC Decision requirements.

> Member States shall determine which of the test methods (see section 3) and corresponding limit values in the table should be used.
>
> (*) If the waste does not meet these values for sulphate, it may still be considered as complying with the acceptance criteria if the leaching does not exceed either of the following values: 1 500 mg/l as C0 at L/S = 0,1 l/kg and 6 000 mg/kg at L/S = 10 l/kg. It will be necessary to use a percolation test to determine the limit value at L/S = 0,1 l/kg under initial equilibrium conditions, whereas the value at L/S = 10 l/kg maybe determined either by a batch leaching test or by a percolation test under conditions approaching local equilibrium.
> (**) If the waste does not meet these values for DOC at its own pH value, it may alternatively be tested at L/S = 10 l/kg and a pH between 7,5 and 8,0. The waste maybe considered as complying with the acceptance criteria for DOC, if the result of this determination does not exceed 500 mg/kg. (A draft method based on prEN 14429 is available).
> (***) The values for total dissolved solids (TDS) can be used alternatively to the values for sulphate and chloride

Infobox 3-13: Wording WAC Decision Chapter 2.1.2.1

Besides, the four Member States (Brussels (Wallonia), Greek, Ireland and Spain) which did not yet put in place specific legislation, the majority of countries have directly adopted the WAC Decision limits. As concerns, additional possibilities or limitations to permit higher limit values see chapter 3.2.2.1.

Note: Some countries e.g. DK, FR and LU have created additional subcategories for inert waste.

Observed deficits:

- In case of a future coverage of the site (concrete, asphalt) a slightly higher leaching limit for the phenol index can be authorised (LU);

Examples of good practice:

- Additional limit values for inter alia Al, Co, Fe, Ag, Sn, ammonium, nitrate, nitrite, phosphate, cyanide, electric conductivity, pH, styrene (e.g. AT, DK; DE, LU) are set;
- Stricter limit values for some substances such as Ba, DOC, Sb, Cd, Zn, phenol index (e.g. LU, DK).

Luxembourg defines more stringent leaching limit values as regards to Cd and Hg (Table 3-3).

Hg leaching limit values for inert landfills			
Landfill type	L/S =2 l/kg	L/S =10 l/kg	C_0 (mg/l)
EU criteria for landfills for inert waste	**0.003**	**0.01**	**0.002**
LU[Legislation36 2006]			0.001
Cd leaching limit values for inert landfills			
EU criteria for landfills for inert waste	**0.03**	**0.04**	**0.02**
LU (Inert waste landfill type 1, with geological barrier			0,005
LU (Inert waste type 1, with future superficial sealing)			0,01
LU (Inert waste landfill type 2 without geological barrier)			0,002

Table 3-3: More stringent Cd and Hg leaching limit values for inert waste landfills

3.2.2.4 Limit values for total content of organic parameters (inert waste)

Inert wastes have to meet limits for:

1. TOC: (*) In the case of soils, a higher limit value maybe admitted […], provided the DOC value of 500 mg/kg is achieved at L/S = 10 l/kg, either at the soil's own pH or at a pH value between 7,5 and 8,0.
2. BTEX
3. PCB (7 congeners)
4. Mineral oil (C10 to C 40)
5. PAHs (Member States to set limit)

Infobox 3-14: Provisions/wording WAC Decision chapter 2.1.2.2.

Most of the MS have fully implemented the WAC Decision limits by their national legislation. In some countries (e.g. UK England/Wales, IE, BE-WA) legislation only refers to the WAC Decision. As regards potential divergences concerning permits for higher BTEX, PCB, mineral oil and TOC limits see chapter 3.2.2.1)

Observed deficits:

- The PCB content is calculated as sum 6 congeners instead of 7 (e.g. DE);
- In case of a future coverage of the site (concrete, asphalt) BTEX and PCB limits are not set (LU);
- Organic limit values do not apply for non-biodegradable wastes such as resins and polymers. (IT).

Examples of good practice: Additional or more stringent limit values such as pH, extractable lipophilic substances, LOI, TOC (and an additional limitation of higher TOC levels) and limit values for biodegradability and caloric value have been set (e.g. especially DE, also DK, LU).

As illustrated in Table 3-5 limit values for PAHs are always set if specific legislation is in place except the Brussels Capital Region, which does not have landfills since several years anymore. But set limits differ considerably both in terms of height and number of included substances.

MS	[mg/kg]
AT	20 (16 substances)
BE	713,5 (10 substances)
DK	4 (mineral, non-hazardous waste: 75)
FI	40
FR	50
DE	30
IE	100
IT	100
LU	type 1: 0,001 mg/l, type 2: 0,0005 mg/l
NL	40
PT	100 (16 substances, EPA)
SE	Carcinogenic PAH: 10 (7 substances); PAH: 40 (8 substances)
UK	100

Table 3-4: Overview of PAH limit values set by MS

3.2.2.5 Criteria for landfills for non-hazardous waste

According to the WAC Decision, Member States may create subcategories of landfills for non-hazardous waste. [WAC Decision] limit values are laid down only for non-hazardous waste, which is landfilled in the same cell with stable, non-reactive hazardous waste.

The possibility to define subcategories of class B landfills has been used by a number of countries (e.g. BE Flanders, BE Wallonia, DK, DE, AT, PT).

In case, co-disposal of stable non-reactive hazardous waste is not permitted, the limit values set in the WAC Decision are not valid. Member States are free to decide about limit values to meet. An evaluation of set limits shows that national provisions range from stricter limits to more permissive limit values and that even within a certain substance group the tendency of limits (more stringent/less stringent) can be different.

Different types of B landfills defined by Member States are as follows:

AT:

- Landfills for C&D waste (Baurestmassendeponie);
- Landfills for residual material, mainly residues from municipal solid waste incineration (MSWI) (Reststoffdeponie);
- Landfills for high quantity of non-hazardous wastes, mainly mechanico-biologically treated waste (Massenabfalldeponie).

BE Flanders:

- Landfills for non-hazardous waste materials of any other origin that comply with the criteria for the acceptance of waste materials;
- Landfills for stable non-reactive hazardous waste materials (e.g. solidified or vitrified waste materials with a leaching behaviour equal to that of the non-hazardous waste materials stated in the landfill above, and which comply with the relevant acceptance criteria;
- Landfills for non-hazardous waste with low level of organic/biodegradable substances, no limit values provided by the WAC Decision (no leaching limit values are provided but parameters as non-polar hydrocarbons, total extractable organohalogen compounds etc.);
- No limit values are given for other non-hazardous landfills; no limit values provided by the WAC Decision (e.g. for mixed non-hazardous household solid waste materials with high levels of organic/biodegradable and inorganic waste materials; for primarily organic non-hazardous waste materials; for non-hazardous waste materials with low level of organic/biodegradable substances, mono-landfill sites for non-hazardous waste materials, other than inert waste materials).

BE-Wallonia (avant-projet):

- CET Class 2.1.a: landfill for inorganic non-hazardous wastes with a low organic/biodegradable content; which do not meet the criteria for co-disposal with stable non-reactive hazardous waste. The limit values of the WAC Decision are not valid for this landfill type and therefore the limit values are less stringent compared to the WAC Decision;
- CET Class 2.1.b: landfill for inorganic non-hazardous wastes with a low organic/biodegradable content, which meet the criteria for co-disposal with stable non-reactive hazardous. The limit values of the WAC Decision are valid for this landfill type;
- CET Class 2.2: landfill for mixed non-hazardous wastes containing a substantial quantity of organic/biodegradable waste and inorganic wastes. The limit values of the WAC Decision are valid for this landfill type.

DK:

- MA0: Non-hazardous mineral waste landfills in a non coastal position with limit values more stringent than WAC Decision (hazardous waste is acceptable in compliance with limit values for mineral waste landfills);
- MA1: Non-hazardous mineral waste landfills in a coastal position with limit values identical to WAC Decision (hazardous waste is acceptable in compliance with limit values for mineral waste landfills);
- MA2: Non-hazardous mineral waste landfills in a coastal position with limit values more stringent than WAC Decision (hazardous waste is acceptable in compliance with limit values for mineral waste landfills);
- Non-hazardous mixed waste landfills (hazardous waste is not acceptable):

DE (hazardous waste in principle acceptable):

- Class I landfill (DK I), above ground landfill for waste with low organic content and low pollutant releases in leaching tests (corresponding to a subcategory of landfill class B with more stringent limits);
- Class II landfill (DK II), above ground landfill for mineral waste with a little higher organic content (TOC < 3 %, LOI < 5 %) and releases in leaching tests; (corresponding to a subcategory of landfill class B. Limit values largely identical to those stipulated in the WAC Decision Annex 2.2.2)

PT:

- landfills for inorganic waste with a low amount of organic or biodegradable material;
- landfills for predominantly organic waste divided into a reactive, biological landfill and landfills a for organic waste which has been treated
- landfills for mixed non-hazardous waste with a substantial amount of either organic or biodegradable and inorganic waste).

Note: In France hazardous waste per se is not acceptable at class B landfills so that no limit values are set on national level. In Ireland co-disposal of stable non-reactive hazardous waste is principally foreseen in the legislation but no landfill has a permit to allow hazardous waste and no hazardous landfill exists.

3.2.2.6 Waste acceptable at landfills for non-hazardous waste without testing

Provisions for landfilling of MSW including a pre-treatment obligation and the mandatory separation from hazardous waste as well as potential short lists for non-hazardous waste, are the key elements that have to be taken into account for the assessment of chapter 2.2.1 (see Infobox 3-15).

> Municipal waste […] classified as non-hazardous in Chapter 20 of the European waste list, separately collected non-hazardous fractions of household wastes and the same non-hazardous materials from other origins can be admitted without testing at landfills for non-hazardous waste.
> The wastes may not be admitted if they have not been subjected to prior treatment […], or if they are contaminated […].
> They may not be accepted in cells, where stable, non-reactive hazardous waste is accepted […].

Infobox 3-15: Wording WAC Decision chapter 2.2.1

Most of the MS have directly transposed the WAC Decision wording into national legislation. In addition, some further restriction or slight variations could be identified. Some countries (e.g. AT, IT, LU) have a short list for non-hazardous landfills:

Short lists:

- In AT landfills for C&D waste and residual material (class B) can accept without testing: EWC codes 17 01 01, 17 01 02, 17 01 03 17 01 07, 17 02 02, 17 03 02, 17 06 04, 17 08 02, 17 09 04 and 19 12 05;

- In LU various inert wastes from the WAC Decision short list and EWC codes 19 08 01, 19 08 02, 20 03 01, 20 03 02, 20 03 03 and 20 03 07 can be accepted without testing;
- In Italy a regional positive list for wastes acceptable without testing is under development;
- In SE non-hazardous waste which is not co-disposed with gypsum or hazardous waste can be accepted without testing;
- MSW is not listed as acceptable without testing (DE).

Waste, which is not accepted on landfills for non-hazardous waste:

- In FR no hazardous waste can be accepted on Class B landfills;
- In AT hazardous waste (except asbestos waste) is not accepted on any kind of landfill other than underground storage;
- In IE there are no permits to accept hazardous waste on landfills for non-hazardous waste.

Pre-treatment:

- In FR a pre-treatment obligation for MSW exempted from testing is not explicitly mentioned in national legislation;
- In Luxembourg EWC codes 19 08 01, 19 08 02, 20 03 01, 20 03 02, 20 03 03 and 20 03 07 can only be accepted after pre-treatment the AT_4 of 10 mgO2/g has to be met;
- In AT wastes can only be accepted if compliant with a breathing activity (AT_4) limit.

3.2.2.7 Leaching limit values for non-hazardous waste (accepted in the same cells as hazardous waste)

The leaching limit set, the methods to be used and the criteria for monolithic waste are the key parameter to be checked with regard to implementation of WAC Decision requirements.

> "…limit values apply to granular non-hazardous waste accepted in the same cell as stable, non-reactive hazardous waste. […]
> Granular wastes include all wastes that are not monolithic.
> Member States shall determine which of the test methods […] and corresponding limit values […] shall be used.
> Member States shall set criteria for monolithic waste to provide the same level of environmental protection given by the above limit values."
>
> [There are additional provisions for DOC and TDS:]
> (*) 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.

Infobox 3-16: Wording WAC Decision chapter 2.2.2

In general it can be stated that the WAC Decision limit values are fully adopted by national legislation for at least one class B subcategory, with L/S=10l/kg as the major testing method chosen. In single cases the national legislation refers directly to the WAC Decision (e.g. BE Brussels, IE and UK England/Wales) or all three columns are presented in national legislation. LU has chosen to use the percolating test for determination of leaching limit values. However, there are also a number of divergences in terms of both more stringent interpretation and additional limit values or as concerns monolithic waste.

Limit values:

In general leaching limit values set by the MS are at least as stringent as provided by the WAC Decision, and in some cases even more stringent. In France disposal of hazardous waste on landfills for non-hazardous waste is banned by law and consequently the limit values from the WAC Decision have not been adopted.

Observed deficits:

- The leaching limit values for landfills for mass waste (class B) correspond to the limit values for landfills for hazardous waste landfills set by the WAC Decision. This is in compliance with the WAC Decision as long as no hazardous waste is co-disposed with mass waste. In Austrian legislation it is possible that asbestos waste (hazardous waste) can be disposed in separated cells; and empty spaces can be filled with mass waste. This combination of hazardous waste and mass waste in the same cell exceeds the set limit values from the WAC Decision for class B landfills. (AT).

Examples of good practice:

- All limit values are more stringent compared to the WAC Decision for defined subcategories (DK subcategories MA0; MA1) or some of them are more stringent (DK: MA2: Ba, Cu, Cr);
- The TDS value cannot be used alternatively to chloride and sulphate (DK);
- More stringent limit values than defined by the WAC Decision have been set (LU, DE);
- Additional limit values as Ag, Cr VI and for cyanide have been set (e.g. AT, IT, LU, DE, BE Brussels, BE Flanders);
- Many additional limit values (e.g. phosphate, nitrate, nitrite or Al) are determined (AT).

Criteria for monolithic waste to provide same level of environmental protection

Criteria to provide the same level of environmental protection as given by the leaching limits for granular waste are defined by a number of Member States. In most cases monolithic waste (normally interpreted as solidified/stabilised waste) has to comply with the same leaching limits as granular waste.

In some Member States waste in addition has to comply with leaching limits before stabilisation whereas it only has to meet limits after stabilization in other.

In the latter case additional differences can be observed as concerns maturation period before testing and method for leaching tests. Differences relate to testing time, and the physical properties of the sample (block or ground).

Observed deficits:

- No criteria for monolithic waste are set (IE, DK,);
- Monolithic waste is not mentioned in national legislation at all (FI, IT, LU, SE) but as regards analysis methods referral is made to CEN norms

In these cases it can be argued, that the limit values set are automatically valid both for granular and monolithic waste and the analysis has to be done according to CEN standards under elaboration. On the other hand, this approach does not cover the issue of setting criteria to ensure that hazardous monolithic waste is stable and non-reactive before acceptance at class B landfills.

- Reduced list of leaching limits for monolithic waste (Flanders);
- The Netherlands restrict the definition and related criteria to stabilised hazardous waste.

Examples of good practice:

- Specific limit values for parameters (heavy metals) to be tested BE (Flanders);
- The same criteria and test methods as for the same type of granular waste after the monolithic waste was crushed (e.g. UK Northern Ireland, SE, FI, DE, DK);
- Limit values have to be met before the stabilizing process (AT, DE);
- Specific provisions for sampling, maturation and leaching test (64 days) as well as specific national leaching limit values are set in the legislation for stabilised hazardous inorganic waste (NL);
- Definition of maturation time (e.g. FR, DE)
- Definition of pH (4 and 11) and size of particle (<10 mm) before the leaching test (DE);
- Additional limit values such as electrical conductivity and certain pH level to be met by monolithic waste (UK England/Wales, UK Scotland).

3.2.2.8 Gypsum waste

The purpose of this section is to avoid any co-disposal of gypsum waste with biodegradable materials to avoid any kind of H_2S origin.

> "Non-hazardous gypsum-based materials should be disposed of only in landfills for non-hazardous waste in cells where no biodegradable waste is accepted.
> The limit values for TOC and DOC given in sections 2.3.2 and 2.3.1 shall apply to wastes landfilled together with gypsum-based materials."

Infobox 3-17: Wording WAC Decision chapter 2.2.3

MS have fully implemented the WAC Decision provisions for disposal of gypsum waste (apart from GR, BE Wallonia and ES where corresponding legislation is not yet in place) and in rare cases even exceed the WAC Decision requirements as additional limit values are set.

Observed deficits:

- In case of AT, gypsum waste can be accepted at mass waste landfills, for which the national TOC limit value for acceptable waste is higher than the limit for class C landfills set in the WAC Decision.

Examples of good practice:

- UK England/ Wales legislation gives the notion "gypsum-based materials" a broader meaning in terms of "gypsum-based materials and other high sulphate bearing materials".

3.2.2.9 Leaching limit values (for stable non-reactive hazardous waste acceptable at landfills for non-hazardous waste pursuant to Article 6(c)(iii))

This section analyses the different leaching limit values of stable non-reactive hazardous waste that is disposed of on landfills for non-hazardous waste. In addition, Member States are requested to set criteria for monolithic waste and criteria to ensure that the waste has sufficient physical stability and bearing capacity are analysed.

"…leaching limit values apply to granular hazardous waste acceptable at landfills for non-hazardous waste Member States shall determine which of the test methods and corresponding limit values should be used. Member States shall set criteria for monolithic waste to provide the same level of environmental protection given by the above limit values."
[There are additional provisions for DOC and TDS:]
"(*) 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."

Infobox 3-18: Wording WAC Decision chapter 2.3.1

In general implementation of this section by Member State legislation is achieved. Differences as regards leaching limits and criteria for monolithic waste are similar as for non-hazardous waste landfilled in the same cell.

Some Member States chose to set more stringent limit values for a number of substances, as listed for Hg and Cd are listed in the table below.

Hg leaching limit values for non-hazardous landfills			
Landfill type	L/S =2 l/kg mg/kg dry substance	L/S =10 l/kg mg/kg dry substance	C_0 (percolating test) mg/l dry
EU criteria for hazardous waste acceptable at landfills for non-hazardous waste	**0.05**	**0.2**	**0.03**
UK Northern Ireland [Schedule1 2004]		0.02	
Cd leaching limit values for non-hazardous landfills			
Landfill type	L/S =2 l/kg mg/kg dry substance	L/S =10 l/kg mg/kg dry substance	C_0 (percolating test) mg/l dry
EU criteria for hazardous waste acceptable at	**0.6**	**1**	**0,3**

landfills for non-hazardous waste			
DK (hazardous landfills in a non coastal position) [Miljøministeriet 2009]	0,072	0,11	0,06
IT [Decreto 2005]		0,2	
LU [Legislation36 2006]			0,1

Table 3-5: More stringent Hg and Cd leaching limits for non-hazardous waste landfills

3.2.2.10 Other criteria (for hazardous waste acceptable at class B landfills)

As concerns other criteria, provisions for TOC, pH and ANC as well as criteria to ensure sufficient physical stability and bearing capacity and criteria to ensure that monolithic waste is stable and non-reactive before acceptance are the key parameter for assessment of implementation level (see Infobox 3-19).

In addition to the leaching limit values under section 2.3.1, granular wastes must meet the following additional criteria:

1. TOC: (*) If this value is not achieved, a higher limit value maybe admitted by the competent authority, provided that the DOC value of 800 mg/kg is achieved at L/S = 10 l/kg, either at the material's own pH or at a pH value between 7,5 and 8,0.
2. pH
3. ANC (must be evaluated)

Member States must set criteria to ensure that the waste will have sufficient physical stability and bearing capacity.
Member States shall set criteria to ensure that hazardous monolithic wastes are stable and non-reactive before acceptance in landfills for non-hazardous waste.

Infobox 3-19: Wording WAC Decision chapter 2.3.2

TOC, pH and ANC

Whereas the majority of EU 15 Member States has literally adopted the WAC Decision limits for other criteria, a number of Member States has chosen to further define or to interpret in another way the provisions set. The major point of interest in this context is a differentiation between inorganic and organic (biodegradable) TOC. The other is the necessity to determine ANC given the lack of a related limit value.

Observed deficits:

- In a few cases, the acceptable pH value slightly differs from the WAC Decision (e.g. DE, FR);
- In the IT legislation the TOC limit value is not valid for inorganic waste;
- In some countries the (e.g. NL, DE, IT, BE (Wallonia avant projet)) the obligation to determine the ANC is not implemented; In this context, it is important to note that the German translation of the WAC Decision does not request such an analysis for class B but only for class C, and that ANC is contained as parameter in the list of substances to be analysed in Annex 3(2) “acceptance criteria”.

- DE has more stringent TOC and LOI values, but apart from WAC Decision provisions there are some additional possibilities for higher limits for inorganic waste;

Examples of good practice:

- Additional limit values are given as BTEX, PCB, Mineral oil, PAH or Naphthalene (e.g. DK, AT);
- DE has more stringent TOC and LOI values
- Legislation requests a compliance with the pH value for all types of waste disposed off in a class B landfill (DE).

Physical stability and bearing capacity

Some MS have implemented criteria for the physical stability and bearing capacity of the waste (e.g. UK England/Wales, UK Northern Ireland, UK Scotland, BE Flanders, DE, AT, NL). Other Member States use a more general description such as “take care of the mechanical forces at the landfill” (e.g. LU, SE, FI).

Non-reactivity of stabilised waste

The majority of Member States request in the national legislation a non-reactivity as stipulated in the WAC Decision. More specific criteria for determination of non-reactivity; however, are generally not set.

3.2.2.11 Asbestos waste

This section of the WAC Decision defines in detail the management provisions for asbestos waste to be disposed of on a non-hazardous waste landfill.

> Construction materials containing asbestos and other suitable asbestos waste maybe landfilled at landfills for non-hazardous waste in accordance with Article 6(c)(iii) of the Landfill Directive without testing.
> For landfills receiving construction materials containing asbestos and other suitable asbestos waste the following requirements must be fulfilled:
> — the waste contains no other hazardous substances than bound asbestos, including fibres bound by a binding agent or packed in plastic,
> — the landfill accepts only construction material containing asbestos and other suitable asbestos waste. These wastes may also be landfilled in a separate cell of a landfill for non-hazardous waste, if the cell is sufficiently self-contained,
> — in order to avoid dispersion of fibres, the zone of deposit is covered daily and before each compacting operation with appropriate material and, if the waste is not packed, it is regularly sprinkled,
> — a final top cover is put on the landfill/cell in order to avoid the dispersion of fibres,
> — no works are carried out on the landfill/cell that could lead to a release of fibres (e.g. drilling of holes),
> — after closure a plan is kept of the location of the landfill/cell indicating that asbestos wastes have been deposited,
> — appropriate measures are taken to limit the possible uses of the land after closure of the landfill in order to avoid human contact with the waste.
> For landfills receiving only construction material containing asbestos, the requirements set out in Annex I, point 3.2 and 3.3 of the Landfill Directive can be reduced, if the above requirements are fulfilled.

Infobox 3-20: Wording WAC Decision chapter 2.3.3.

Some divergences exist concerning disposal of asbestos waste but the differences are not considered to be very significant

Observed deficits:

- In one case, a proper packaging is considered to be a covering and therefore only not properly packed asbestos waste has to be covered (NL);
- In DE final top cover, no works at the place of disposal and measures to limit use after closure are not mentioned in the corresponding article on asbestos, but are covered by Annex 1 (2.3) which contains a general obligation for a final top cover for all landfill types and Annex 5 (10), (9 and 4) "take appropriate measures to avoid that humans can come into contact". Detailed information on practical management of asbestos waste has been compiled in a specific manual of the National Expert Working Group on Waste management (LAGA).
- Aspects such as a "register of deposition" and "sprinkling of waste" are not mentioned in the UK (Scotland) legislation.

Examples of good practice:

- Additional limit values for the disposal of asbestos waste are set (e.g. content, of asbestos waste, storage density, relative density, liberation rate, thickness of the top cover)(IT);
- The legislation in England and Wales gives the notion "suitable asbestos waste" a broader meaning in terms of "suitable materials";
- National legislation defines specific requirements to accept asbestos waste at class C landfills (e.g. sealed double big bags, only in cells were it is entombed into stabilised/solidified waste).

3.2.2.12 Leaching limit values for hazardous waste landfills

Key parameters for the evaluation of implementation of this section of the WAC Decision by national legislation correspond to those for class B landfills.

…"leaching limit values apply for granular waste acceptable at landfills for hazardous waste, […]
Member States shall determine which of the test methods and corresponding limit values in the table should be used.
Member States shall set criteria for monolithic waste to provide the same level of environmental protection given by the above limit values.

"(*) 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 1 000 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."

Infobox 3-21: Wording WAC Decision chapter 2.4.1

In general Member States have implemented WAC Decision requirements for class C landfills. Some deficits can be observed as concerns criteria for monolithic waste. On the other hand, additional or more stringent limit values are set in a number of Member States.

Observed deficits:

- A higher DOC level can be authorised in case of inorganic carbon. As inorganic carbon is already distracted in the calculation formula for DOC this reading is without practical effect and according to information from German authorities will be deleted in the upcoming revision of the DepV (DE);
- The TDS limit does not apply for ashes from wood combustion plant (DE).

Examples of good practice:

- In a number of countries much more stringent limit values are especially set for Cd and Hg (e.g. AT, DK, IT, LU, UK Northern Ireland);
- More stringent limit values (e.g. Ba, Cr, Cu, Sb, Ni, chloride, fluoride, sulphate) are defined for landfills for hazardous waste (DK, LU);
- Additional limits are set as cyanide, Ag, Cr, Cr VI, Co, Sn, ammonium, nitrite, aromatic organic solvents, non phosphoric aromatic solvents, total aromatic phosphoric solvents, chlorinated aromatic solvents (e.g. BE Flanders, AT, IT, FR).

A compilation of national, more stringent leaching limits for Hg and Cd for hazardous landfills is provided in Table 3-7.

Hg leaching limit values for hazardous landfills			
Landfill type	L/S =2 l/kg mg/kg dry substance	L/S =10 l/kg mg/kg dry substance	C_0 (percolating test) mg/l dry
EU criteria for waste acceptable for landfills for hazardous waste	**0.5**	**2**	**0.3**
AT [DeponieVO 2008]		0.5	
DK (hazardous landfills in a non costal position) [Miljøministeriet 2009]	0.012	0.051	0.0064
IT [Decreto 2003]		0.5*	
LU [Legislation36 2006]			0.1
UK Northern Ireland [Schedule1 2004]		0.4	
*Unit [mg/l] is used instead of [mg/kg]; values have been converted			
Cd leaching limit values for hazardous landfills			
EU criteria for waste acceptable for landfills for hazardous waste	**3**	**5**	**1,7**
AT [DeponieVO 2008]		0.5	
DK (hazardous landfills in a non-coastal position) [Miljøministeriet 2009]	0,09	0,14	0,07
IT [Decreto 2003]		2*	
LU [Legislation36 2006]			0.5
UK Northern Ireland [Schedule1 2004]		1	
*Unit [mg/l] is used instead of [mg/kg]; values have been converted			

Table 3-6: More stringent Hg and Cd leaching limits for hazardous waste landfills

3.2.2.13 Other criteria (to be met by hazardous waste destined for class C landfills)

"In addition to the leaching limit values […] hazardous wastes must meet […] [total content limits for:
LOI: (*) Either LOI or TOC must be used.
TOC: (**) If this value is not achieved, a higher limit value maybe admitted by the competent authority, provided that the DOC value of
1,000 mg/kg is achieved at L/S = 10 l/kg, either at the material's own pH or at a pH value between 7,5 and 8,0.
ANC: Must be evaluated"

Infobox 3-22: Wording WAC Decision chapter 2.4.2

Most of the MS have fully implemented the WAC Decision limits for other criteria. However, in some MS divergences (more stringent as well as less stringent) exist (e.g. DK, DE, IT and NL).

Observed deficits:

- ANC does not have to be measured (IT, NL, BE-WA avant-projet); for DE see explanation in chapter 3.2.2.10.
- Non-biodegradable organic material is excluded from the quantification of TOC (IT).

Examples of good practice:

- Additional parameters to be tested and corresponding limit values are given e.g. Dioxin, Furan, organic solvents, pesticides, BTEX, PCB, pH, the phenol index, organochlorine compounds, biodegradability, heating, extractable lipophilic substances, HCT, cyanide and styrene (e.g. BE Wallonia, DK, FR, DE).

3.2.2.14 Provisions for sampling and testing

Sampling and testing for basic characterisation and compliance testing shall be carried out by independent and qualified persons and institutions. Laboratories shall have proven experience in waste testing and analysis and an efficient quality assurance system.
Member States may decide that:
1. the sampling maybe carried out by producers of waste or operators under the condition that sufficient supervision of independent and qualified persons or institutions ensures that the objectives set out in this Decision are achieved;
2. the testing of the waste maybe carried out by producers of waste or operators if they have set up an appropriate quality assurance system including periodic independent checking.
As long as a CEN standard is not available as formal EN, Member States will use either national standards or procedures or the draft CEN standard, when it has reached the prEN stage.
[…]
For the sampling of waste — for basic characterisation, compliance testing and on-site verification testing — a sampling plan shall be developed according to part 1 of the sampling standard currently developed by CEN.

For waste analysis a number of standards are listed in the Decision which in the meantime have been further developed.

Infobox 3-23: Wording WAC Decision chapter 3

Relevant analysing standards as required by the WAC Decision have been gathered and listed for the assessment of their legal implementation into national legislation. Besides, the compliance of each national standard with the CEN standards was not analysed.

Test methods are implemented by all covered MS. Additionally to the EN standards a number of countries use their own national standards or adopted them from neighbouring countries (e.g. BE-Fl from DE; UK Northern Ireland from UK England/Wales).

In some countries (e.g. BE Brussels, BE Wallonia, UK England/Wales, UK Scotland) the standards are literally implemented from the WAC Decision or it is referred to the Decision.

In other Member States additional standards have been added. Many of these standards cover sampling, sampling plan, PAH, PCB, TDS, leaching tests with different pH levels and water analyses.

3.2.2.15 Criteria for underground storage

Relevant parameter for implementation of WAC Decision requirements for underground storage sites comprise the necessity of a site-specific risk assessment (see boxes below), exclusion of an additional number of waste and separation from active mining activities.

> For the acceptance of waste in underground storage sites, a site-specific safety assessment as defined in Annex A must be carried out. Waste maybe accepted only if it is compatible with the site-specific safety assessment.
> At underground storage sites for inert waste, only waste that fulfils the criteria set out in section 2.1 may be accepted.
> At underground storage sites for non-hazardous waste, only waste that fulfils the criteria set out in section 2.2 or in section 2.3 maybe accepted.
> At underground storage sites for hazardous waste, waste maybe accepted only if it is compatible with the
> site-specific safety assessment. In this case, the criteria set out in section 2.4 do not apply. However, the waste must be subject to the acceptance procedure as set out in section 1.

Infobox 3-24: Wording WAC Decision chapter 2.5

Site-specific risk assessment
The assessment of risk requires the identification of:
— the hazard (in this case the deposited wastes),
— the receptors (in this case the biosphere and possibly groundwater),
— the pathways by which substances from the wastes may reach the biosphere, and
— the assessment of impact of substances that may reach the biosphere.
Acceptance criteria for underground storage are to be derived from, inter alia, the analysis of the host rock, so it must be confirmed that no site-related conditions specified in Annex I to the Landfill Directive […] are of relevance.
[…]
The site specific risk assessment of the installation must be carried out for both the operational and post-operational phases. From these assessments, the required control and safety measures can be derived and the acceptance criteria can be developed.
An integrated performance assessment analysis shall be prepared, including the following components:
1. geological assessment;
2. geomechanical assessment;
3. hydrogeological assessment;
4. geochemical assessment;
5. biosphere impact assessment;
6. assessment of the operational phase;
7. long-term assessment;
8. assessment of the impact of all the surface facilities at the site.

Infobox 3-25: Wording WAC Decision Appendix A, chapter 1.2

Currently, only four of the assessed EU-15 MS actively exploit the possibility of underground storage systems. (DE: 5 salt rock formation, UK: 1 salt rock formation and 2 hard rock formation, SE: at least 1 hard rock formation).

Nevertheless, almost all MS have very well implemented the corresponding requirements for underground storage as set by the WAC Decision.

No criteria for underground storage are currently set in Sweden and Denmark and provisions in place are highly vague in France.

3.3 State of Implementation in practical landfilling procedures

This chapter provides a summary evaluation of the site visits performed in each of the EU 15 Member States covered in this report. Landfills have been selected in cooperation with national or regional authorities or with national waste management associations. The number of landfills ranged from one to three in each Member State depending on its size.

Hence results and impressions as obtained in this report can not provide a comprehensive picture of the waste management situation in a given Member State.

As based on a voluntary approach the results certainly correspond more to an overview of good practice for a given landfill class in the different Member States. Nevertheless also with this restriction to be kept in mind they allow to draw valuable conclusions on waste management and compliance with legal requirements in EU 15.

3.3.1 Overview of WAC Decision implementation in daily practice

The implementation of WAC Decision requirements in daily practice has been investigated by means of a screening of landfills in all EU 15 Member States. Visited sites comprise all landfill types as well as various sizes and ages.

In general it can be concluded that practical application of the procedures is well established. This in particular applies for basic characterisation, whilst there are some weaknesses and divergent interpretation as regards systematic compliance testing. With respect to on-site verification, provisions are well fulfilled as concerns documentary control. Visual inspection is performed but constitutes a weak point in principle. On-site sampling is commonly performed at class C landfills but is rarely executed on class A and class B landfills. For more details see the chapter below.

3.3.2 Detailed assessment of WAC Decision implementation in daily practice by landfill class

Landfills according to EU legislation are separated into four different classes, which are landfill class A for inert waste, landfill class B for non-hazardous waste, landfill class C for hazardous waste and landfill class D for underground storage systems.

Due to the little need for acceptance procedures in landfill class A and the small amount of underground storage systems, the landfill visits were focussed on class B and C landfills; in particular when only one landfill site was visited in a MS.

3.3.2.1 Landfill class A (landfills for inert waste)

Blackmountain Landfill Phase II/III in the UK Northern Ireland, starting operation in 1970 was the only inert landfill site which could be visited.

Technical standard, gas and leachate treatment

The landfill was fenced and equipped with office buildings in accordance with Landfill Directive requirements; artificial engineering systems (artificial barrier, gas collection, leachate collection and sealing systems, surface sealing) are not requested for inert landfills and were not put in place.

General management procedures

The landfill was equipped with a software system for data management and disposed of standardised documents for identification and information procedures.

Basic characterisation procedures

Basic characterisation in terms of an official request from the waste producer and provision of waste relate information in a standard form took place as foreseen by the WAC Decision and corresponding national law.

Due to the fact that accepted wastes are exclusively those listed on the short list exempted from testing chemical analysis however, was not made.

Compliance testing

Due to exemption from testing requirements of delivered wastes the landfill does not perform compliance testing.

On-site verification

Standard acceptance procedures at the entrance gate such as checking of documents, weighing and first visual inspection took place. In addition a second visual control was performed at the place of unloading. For this purpose arriving trucks were requested to unload into a pit, from where a bucket digger shovels the waste into a void. This procedure allows a visual inspection in batches of shovel loads.

Information about practical acceptance procedures on inert waste landfills managed by large private companies, in addition has been obtained during the visit to France.

According to this information at least private waste management companies use standardised application procedures with basic characterisation information in advance in accordance with WAC Decision requirements. Chemical analysis for basic characterisation is requested for homogenous inert wastes such as soils and sludges. Specific compliance testing is not requested due to the obligation to annually renew the basic characterisation and on-site sampling is not performed in accordance with French legislation.

3.3.2.2 Landfill class B (landfills for non-hazardous waste)

The majority of visited landfills pertained to class B or constituted installations with separate sections authorised as class B and class C.

The landfill sites for non-hazardous waste can be separated in three categories (landfills for MSW, combined landfills for MSW and other non-hazardous wastes and landfills for general non-hazardous waste (meaning no MSW)).

As concerns the different types of landfills, the following numbers have been visited:

- Municipal solid waste landfills: 3x in Ireland, 1 x in Spain;
- Combined landfills for MSW and other non-hazardous waste: 1x FI, 4x FR, 3x GR, 3x IT, 1x LU, 1x ES;
- Landfills for industrial non-hazardous waste: 1x AT, 1x DK, 1x DE, 1x NL, 1x UK.

General terms

Installations comprised privately and publicly managed sites, with first permits dating from the late sixties, early seventies (SE, DE, AT, FR, FI, LU) to the recent past (e.g. GR 2006, 2008). Sites in Spain, the Netherlands, Italy and Ireland, the majority of sites in France and the sites in Denmark and Scotland started operation in the late eighties and the nineties.

Operation of the visited sites is foreseen to continue in most cases for the next 10 to 20 years. Overall operation times depend on the type of waste landfilled. In case the majority of waste is mixed MSW landfills tend to be filled within 10-15 years. In case of exclusive disposal of mineral wastes lifetimes of installations are prolonged to 30-40 years.

The capacity of the landfills ranged from <1-1.5 million m³ (GR, AT, LU) to over 10 million m³ with the majority of sites in the range of 3-5million m³ overall capacity and an annual input in a dimension of 300,000 tons (range 60,000 – 700,000 tons).

Technical standard, gas and leachate treatment

All visited sites corresponded to the technical standards sets by the Landfill Directive with appropriate geological barrier, leachate collection and sealing systems and drainage layers as well as superficial coverage. Leachate water was either treated on-site (biological and reverse osmosis) to reach appropriate quality or was collected and treated in municipal WWTPs. Gas collection systems were generally installed with energy recovery established at a majority of sites. Additional heat recovery was less frequent. In part gas was only flared due to insufficient quantity and quality.

Details of sealing systems (height and permeability of geological barrier, artificial surface sealing, natural mineral layer) as well as recirculation of leachate water (re-injection) were depending on national requirements (e.g. more stringent in France) and the management approach (e.g. conventional class B with biodegradable waste, bioreactor or non-hazardous waste with low mineral content.)

The majority of sites apart from the landfill comprise additional storage and treatment facilities such as civic amenity sites, storage places for waste wood, high caloric waste, or hazardous waste, composting areas, separation lines or full MBTs. A baling station (for climatic reasons – strong winds) and a shredder for waste tyres were additional installations, only encountered at single sites.

A specific feature to be highlighted is the fact that class B landfills in France are increasingly authorised and managed as bioreactor landfills. A similar system has also been applied at one landfill in Ireland.

Highly efficient energy recovery from landfill gas (heat and electricity) has been observed in a number of landfills. Intelligent solutions for heat recovery are either the use of gas for an on-site medical waste disinfection unit or collaboration with external installations which need steam for e.g. cleaning or drying purposes (wood chip production, feed production).

General management procedures

There are two very different acceptance procedures applied in landfills for non-hazardous waste. One is for municipal solid waste (acceptable without testing), and the second one is for other non-hazardous wastes necessary to be tested.

In general class B landfills are equipped with electronic data management systems, which in case of large private owner companies may even be developed as company internal intranet.

Waste acceptance is organised as standardised procedure, comprising in principle in all cases the three steps of basic characterisation, compliance testing and on-site verification.

The waste producer in most cases can only deliver after he has received an official certificate of acceptability issued by the landfill operator.

Information is documented and stored often both in paper and as electronic version for the periods required by national legislation which is conform to WAC Decision requirements. Often mandatory storage times are even exceeded at least for the electronic version of documents.

Examples of good practice:

- Centrally managed (nationwide) electronic data management system in AT;
- Use of GPS systems for register of waste location on site.

Basic characterisation procedures

At all visited landfills, the basic characterisation of a specific waste type is performed by means of a specific type of document containing basic information about the waste producer, waste origin, appearance, code and quantities.

The document is in general developed by the landfill operator, so that the design differs but basic content is similar. In general a full testing of all parameters set in the WAC Decision is requested for all wastes (e.g. soil, ashes, sludges) except of MSW.

The waste producer has the responsibility for the chemical analysis, but landfill operators may offer support. In most cases the analysis is performed by an external laboratory but there are landfills which also can offer such service themselves. If deemed necessary the landfill operator can ask for analysis of additional substances.

In quite a number of sites, the validity of the basic characterisation was limited to 1 year or less (depending on waste type and quantity). Then a new document with another analysis (if relevant) is requested.

For landfills in Greece the waste producer has to provide in addition to the waste related information a copy of his operation license and an approval of his environmental permit.

In Italy there are three different procedures for acceptable waste, depending on their classification as either “green” (no characterisation e.g. MSW), “blue” (facilitated procedure) or “red” (chemical analysis requested).

On the other hand the delivery of MSW at least in one case each in Greece, Ireland and Italy and Luxembourg was exempted from a basic characterisation procedure based on documents.

The landfill visited in the Netherlands started mandatory testing of class B waste in case of co-disposal with hazardous waste only in July 2009.

In Sweden the basic characterisation of a new waste stream was done on-site in a separate area by the landfill operator, in contrast to all other site visited.

Examples of good practice:

- Austrian landfill operator request as regular sampling over a years period for basic characterisation of regularly generated wastes and only provides a “temporal approval certificate” until all analyses have been evaluated;
- In the NL since July 2009, 5 single batches of one waste stream have to be tested to form the basic characterisation result in order to reflect the potential variability of waste composition;
- EPA handbook for determination of variability (e.g. SE);
- Definition of two procedural schemes for waste to be subject to testing and for waste exempted from testing requirements (e.g. FR);
- Annual renewal of basic characterisation (e.g. FI, FR, DE);
- Testing requirement and limit values even if no co-disposal with hazardous waste (e.g. FR).

Compliance testing

The interpretation of compliance testing was the factor which most strongly varied between landfills visited, due to underlying national legislation.

In accordance with WAC Decision requirements; compliance testing is performed once a year (e.g. ES, SE, DK, IE) but only if chemical analyses were requested for the basic characterisation.

In Austria and Germany the testing for key variables is defined during the basic characterisation. In Austria frequency is depending on the relation of analysis results to the limit values set and to the variability of waste characteristics as shown during basic characterisation. In Germany it is related to legally binding time intervals or delivered waste quantities.

In France landfill operators request a full renewal of the “dossier” with a full chemical analysis (if relevant.) each year.

In Italy the Regional Environmental Authorities can set specific provisions for waste from the "red" list (e.g. 1/year for MSWI ashes) but have not been done this yet.

In the Netherlands the new legislation has taken over the responsibility from the landfill operator by defining fix criteria for compliance testing (frequency and key variables) depending on the results of basic characterisation.

In some cases it appears that differentiation between "on-site testing" and "compliance testing" is not fully clear to landfill operators and is mixed in interpretation.

On-site verification

As concerns practical application of on-site verification it is important to differentiate between

- Check of documents and service contract, weighing,
- Visual control,
- Sampling and analysis.

Check of documents and service contract, weighing

As regards check of documents the large majority of visited landfills use electronic data management systems and have a well established control scheme in place. Drivers are either identified by the name of the waste producer, the "approval certificate", a chip card (electronic carriers' identification card) or the license plate number which is linked to the internal identification number of the waste contract.

In single cases the validity of the contract had to be searched in a separate data base, or the relevant information is only filled in at the gate.

Information from the weighbridge (directly at, or closely behind the gate) often transferred automatically into the system or it is transferred into it manually by the operator.

The further documentation and tracing of the waste load is ensured by means of an internal note that is checked, and often signed, stamped or punched at any interim treatment facility or at the place of unloading.

This document has to be handed over to the gate officer after final weighing in exchange to the "weighing bill" or "certificate of acceptance" on the basic characterisation document. French landfill operators in addition check each waste load for radio-activity.

Visual control

At a number of sites the entrance gate is equipped with overhead mirrors or cameras to survey entry and exit and to have the possibility to do a first visual control. It however, has to be admitted that in many cases arriving trucks are covered or closed, so that visual information about the delivered load can not be obtained.

Thus the crucial point of control in practice is at the place of unloading, where generally one to two employees are present. The employees were reported to be trained to detect and to separate or to refuse unacceptable waste or waste compounds. Employees are equipped with communication tools and are instructed call the landfill manager for support and further decision in case of doubts. One site reported about up to 600 complaints expressed per year, which shows a high level of vigilance of the staff.

Some landfills (e.g. Ireland) are equipped with a "quarantine" area where waste is directed to in case of suspicion for a more detailed inspection or in case of suspicion at the place of unloading.

On another landfill (LU) waste is not deposited directly but is sent to an on-site MBT installation first, where a visual control can easily be made.

Sampling and analysis

Regular sampling and analysis of waste delivered at class B landfills is not a common practice in the majority of visited sites. Either it is not practiced at all or it is restricted to cases of suspicion. On the other hand there are some cases, where sampling and testing is performed.

Examples of good practice:

- Illustrated manuals of unacceptable wastes;
- Regular training activities for employees;
- Company wide quality standards and procedural schemes;
- Environmental certification (e.g. EMAS, ISO 14001) and auditing;
- In Italy visited landfill operators reported about a mandatory photographic documentation, sampling and analysis of any "new" waste type delivered the first time and about a general obligation to test green or blue listed waste once a year;
- In Germany regular on-site sampling/analysis is requested by national law;
- In DK spot tests for non-hazardous mixed waste have to be done once a month;
- In AT spot tests for monolithic waste have to be done twice a year;
- In Italy green and blue listed wastes have to subject to sampling and testing once a year.

3.3.2.3 Landfill class C (landfills for hazardous waste)

In total 10 landfills for hazardous waste, partly installed jointly with a class B landfill have been visited. The distribution of sites to different Member States is as follows (generally one each):

BE (Flanders), DE, DK, 2x FR, IT, NL, PT, ES, SE, UK England/Wales, UK Scotland.

General terms

First authorisation of visited landfills dates back into the late sixties/early seventies. The majority of sites was authorised in the eighties and nineties and one site was only opened in 2008. The selection comprised publicly and privately managed sites, with however, a clear predominance of private

installations in this sector. Except of one site the landfills will remain in the operational phase for the next decades. The overall capacity ranges from <1 Mio m³ to 25 Mio m³

The landfills are often part of integrated treatment plants with incineration plants or stabilisation plants as additional treatment facilities. Further facilities encountered are industrial WWTPs, or installation for soil decontamination.

Major waste types disposed of are ashes, sludges, slags, filter cakes, contaminated soils and asbestos waste.

Technical standard, integration of other treatment methods, gas and leachate treatment

All sites visited were fully compliant with Landfill Directive requirements as concerns technical standard and leachate collection and treatment. Gas production in general is not an issue at hazardous waste landfills due to the inorganic character of the deposited waste.

General management procedures

All Class C landfills visited are equipped with sophisticated electronic data management systems.

At a number of sites, automated alert systems trigger an alarm in case renewal of the basic characterisation or compliance testing is requested.

Waste acceptance is exclusively organised as standardised procedure, comprising basic characterisation, compliance testing and on-site verification including mandatory chemical analysis.

Waste delivery is only possible after a prior information and consent procedure including in most cases information in advance about the actual delivery date.

Information is documented and stored often both in paper and as electronic version for the periods required by national legislation which is conform to WAC Decision requirements. All information related to basic characterisation and waste delivery in many cases is stored until the end of the aftercare period.

In the majority of countries stabilisation of hazardous waste not compliant with limit values in granular form is an integrated part of waste management.

In case of pre-treatment and alternative treatment facilities on site traceability of the waste on-site is generally assured by a system of internal “running ticket” which is stamped, signed or punched with an individual mark by each of the interim treatment stations.

Basic characterisation procedures

At all visited landfills, the basic characterisation is performed by means of a detailed “basic characterisation” document containing information about the waste producer, waste origin, appearance, code and quantities, chemical composition and leaching behaviour. In general “hazardous waste identification and transport forms” as requested by EU and national legislation for hazardous waste management are used as additional or alternative information source.

Documents are partly standardised at national scale, partly lay-outed individually by the landfill operator, so that the design differs but basic content is similar. A testing of all parameters set in the WAC Decision is mandatory. In addition in many cases a number of additional substances are tested because of national legislation or because requested by the landfill operator. (This can be based on an overall precautionary approach of the management company or on a specific information need/suspicion of the landfill operator).

Sampling and test methods are generally based on national legislation.

Although the waste producer has the responsibility for the basic chemical analysis, landfill operators often offer support or even systematically request a sample to do the analysis on their own.

After evaluation of the information the landfill operator enters the information in the internal database and issues an acceptance certificate which allows the waste producer to start the delivery.

In quite a number of sites, the validity of the basic characterisation is limited to one year. In Italy it can even less, depending on the waste type. Then a renewal of the basic characterisation including a new full chemical analysis is requested.

In some countries additional documents are requested and additional analyses are performed (hydrocarbons and POPs) for contaminated soil.

On the landfill visited in Sweden the chemical analysis for basic characterisation is performed on-site from the first waste load, which is stored separately until results are available.

Compliance testing

While a number of countries (FR, IT, ES) request a full basic characterisation after one year, which is regarded as “compliance testing”, testing in other Member States is restricted to key parameter as laid down by the landfill operator in other Member States (e.g. DE, PT). If requested by national law compliance testing is performed more often than once a year (e.g. quarterly or depending on the delivered quantity). At the Spanish landfill compliance testing was performed either once per year or every 200 tonnes.

If stabilisation is performed on-site each batch of waste is subject to “compliance testing ” after a certain time of maturation. Time of maturation and used leaching test depend on national requirements.

At the site visited in Belgium compliance testing was performed weekly in the past. Currently it is performed quarterly with a focus on leaching of heavy metals. The driving factor for compliance testing in Belgium is the relation of the basic chemical analysis to the set limit values. All substances which are 20% above or below the internal limit value are subject to testing.

On-site verification

On-site verification follows largely the same procedures as at class B landfills with the difference that in some countries (e.g. FR, PT) sampling of each load is mandatory.

If direct sampling is not possible, (dusts, sludges) because the waste is transported in a closed vehicle, sampling is performed at the stabilisation plant, from where it is send to the laboratory or the driver has to return it to the entrance gate.

Sample storage ranges from 1-2 months to the end of aftercare period.

For German landfill operators the testing frequency is determined by the national manual PN 98.

At an Italian landfill for hazardous and non-hazardous waste, controls focussed on the first load of each new waste. This has to be delivered in big bags and is stored separately until the analysis results are available.

At the sites visited in the UK (England/Wales and Scotland), on-site sampling is interpreted as compliance testing and thus is performed in certain intervals as decided upon, based on the basic characterisation assessed by the landfill assessment committee. Sampling and analysis is triggered by automated alarm from the electronic data management system.

For on-site verification of stabilised waste (see compliance testing).

In assessing the practical landfilling procedures in EU 15 Member States it is important to highlight that Austria, Ireland and Greece to do not have any hazardous landfills.

Infobox 3-26: Member States without hazardous waste landfills

3.3.2.4 *Underground storage systems*

Due to the very limited number of underground landfills in EU Member States, K+S Herfa Neurode (DE) were the only landfill site for underground storage which was visited.

The installation represents a hazardous waste landfill and is located in a salt rock formation in a depth of about 700m.

Apart from additional restriction to take into account, acceptance procedures are very similar as for other landfills for hazardous waste. Samples are always requested from the waste producer for internal testing.

A specific feature is the systematic chemical analysis for on-site verification of the load, the mandatory packaging of all waste and the grouping of waste into classes of compatible wastes.

Samples are stored for unlimited time.

All wastes disposed can be returned to the surface when needed or appropriate for recovery.

3.4 Experts opinions and proposals for amendment of the WAC Decision

This chapter comprises a compilation of challenges in application of waste acceptance provisions identified by competent experts from waste management companies and weaknesses of the WAC Decision identified by the project team in the context of the evaluation the compiled information.

3.4.1 Experts opinions

During site visits landfill operators have been encouraged to express problems encountered in on-the-ground application of the WAC Decision requirements. This opportunity to report on encountered challenges and to make suggestions with respect to potential amendments of the EU Decision was generally appreciated and provided valuable results. The comments can be roughly classified into different categories as presented in the following chapters.

3.4.1.1 Guidance for WAC Decision application

Guidance for application of the WAC Decision: A number of experts stressed the importance of providing Europe-wide or nationwide guidance for the implementation and practical enforcement of the WAC Decision requirements. Such a need is exemplarily reflected by the fact that a number of Member States did not develop specific national provisions yet, due to an interpretation of the Decision as directly applicable at national scale.

Provisions for storage until analysis results are available: Another challenge identified was the problem how and where to store waste until a basic characterisation analysis/compliance testing/or on-site testing result is available. This problem is particularly important in Member States where mandatory sampling and testing is requested at delivery whilst rapid test methods are not available.

Visual control before unloading: Visual control before unloading is requested by the WAC Decision and is applied to the extent possible. The feasibility and benefit of this measure however, has been repeatedly questioned, even more as in many cases transport vehicles are closed on top. But also in case of open vehicles such control would only provide information on the top layer of waste. Thus it was suggested to focus on visual control at the place of unloading with a priority on appropriate training and education of the staff.

3.4.1.2 Criteria and test methods for monolithic waste

Leaching tests for monolithic waste: Tests standard for monolithic waste as currently developed under CEN were considered as too stringent and as not appropriate to reflect the actual leaching behaviour under storage conditions. According to expert opinion a major function of stabilisation treatment would be reversed by grinding prior to testing.

3.4.1.3 Specific leaching limits

Limit values for Chloride and Sulphate: For some waste types (e.g. ashes) the limit values for chloride and sulphate are considered to be too stringent. Within the best practical environmental option, it is proposed to increase the limit values for these parameters to accept such waste. In contrast, another expert stated that the sulphate limit is not stringent enough.

3.4.1.4 Organic content and other limits/measurements requirements

DOC, TOC and LOI limit values: A considerable number of experts stated that the DOC, TOC and LOI limit values set by the WAC Decision are very stringent and are difficult to meet for a number of industrial waste streams although they have a low biodegradability. This in part due to weaknesses of existing test methods, which can produce false positive results due to cross reactions of other compounds.

This observation corresponds well to complaints expressed at the occasion of awareness raising and information exchange seminars on landfill of waste in a number of Member States.

A proposal for a pragmatic solution, taking into account the different level of reactivity/biodegradability of inorganic and organic carbon, is, to make a distinction between biodegradable organic matter and non-biodegradable organic waste as concerns the possibility to permit higher limit levels or to exclude inorganic wastes from compliance with limit values set. As concerns the DOC limit for hazardous waste there is a proposal which has been transmitted by a Member State authority to increase to the double or triple of its current limit or alternatively to restrict it to biodegradable waste.

Authorisation of higher limit values: One expert addressed the procedural requirements for possible authorisation of higher limits with a view on a potential simplification, without increasing the environmental risks. It was stressed that currently such permits are based on justified case by case decisions, so that a similar risk assessment has to be made over and over again, when similar waste from other plants shall be disposed of at a landfill even if a higher limit value (on the basis of a risk assessment) has been permitted already before. The benefit of such practice was questioned and it was suggested that an elevated limit value for a certain parameter should be generally valid for a specific type of waste at a given landfill if once justified.

ANC measurement obligation: It was questioned why the WAC Decision requests a determination of the ANC without defining a limit value.

A compilation by country of comments and proposals expressed by experts during site visits and discussions with Member State authorities is provided in the table below. For further details please see the country reports in Annex 1.

MS	Expert complaints & proposals related to potential modifications of the WAC Decision
DK	• Guidance for the WAC Decision should be elaborated. • The Cd limit value in the leaching test is considered to be very strict.
FR	• Leaching tests for monolithic waste as used in NL and as currently developed under CEN are deemed as very strict and as not appropriate for estimation of leaching behaviour under disposal conditions and only relevant for conditions as observed for construction materials. • WAC Decision limit values for Chloride and Sulphate based on limit values for drinking water are regarded as very strict.
	• Leaching limit values for non-hazardous wastes in the WAC Decision are partly very low.
	• Instead of separation of biodegradable fractions before landfilling by means of MBT or separate composting, the operation of a landfill as bioreactor should be reconsidered as appropriate treatment technology in the light of climate change and the treatment hierarchy
DE	According to a letter sent to the European Commission by the Ministry of Environment TOC, LOI, DOC and limits should be reconsidered: • TOC and ignition loss are considered as too strict for a number of mineral hazardous wastes (e.g.

MS	Expert complaints & proposals related to potential modifications of the WAC Decision
	waste from the oil and gas exploitation). LOI results can become false positive due to carbonates or elemental sulphur contents which form carbon dioxide and sulphur dioxide or oxidation of metal compounds. It is recommended that the local authorities should be able to accept waste with a too high TOC or ignition loss value if the source is not organic. • The DOC limit value is too low as there are many wastes (often different mineral sludge which are not biodegradable and a thermal treatment would therefore be contra productive) with higher values which have a low gas formation. It is suggested to increase the value from 100mg/l up to 300mg/l or at least 200mg/l.
	• The measurement obligation for the ANC is not useful as corresponding limit values are missing.
IE	• The DOC limit value is seen as too strict as it cannot be exceeded in case of filter cakes. On the other hand the sulphate limit value is considered to be quite high.
NL	• There are CEN standards for the analyses of monolithic waste, however, dedicated limit values are missing in the WAC Decision. • Waste that contains 80% of material with particles > 40mm should not be necessary to be tested. The reason is that the material is crunched in smaller pieces for testing and the resulting leachate values are therefore much higher than from the original material and the measuring results are not representative for the behaviour of the waste in the landfill. This theory has recently been confirmed by tests (commissioned by the Dutch government) on railroad sleepers and roofing felt. • Visual inspection before unloading does not seem practical. It will only provide information on what is lying on top. The full load can only truly be inspected during unloading. The first sentence of section 1.3 of the Annex to the WAC Decision should be: “Each load of waste delivered to a landfill shall be visually inspected”. • There is no provision for the management of waste loads during the period until analyses results from on-site sampling are available. Storage of all the waste at the production site until the results from the laboratory are produced is practically not possible (storage room and handling costs). If only the batches (loads) that have been sampled are stored and the loads that do not require sampling are landfilled, the storage does not prevent the possible landfilling of loads that do not meet the criteria. • There should be a clear distinction between biodegradable organic matter and non-biodegradable organic matter. The carbon limit values as TOC, DOC and LOI do not take in account the reactivity (possible negative influence) in the landfill site and consequently do not address what they intended to address. It is no problem to landfill stable carbon. Two examples of which there is even a positive influence of carbon are activated carbon filters and resins from ion exchangers. The limit values for TOC and DOC are also a problem for landfilling of contaminated soils soil cleaning residues and drainage sludge. Even if it is proven that further treatment is not possible these materials contain (for the most) a high TOC and DOC. But to a very large extent this is stable humid substance. It is not possible to bring down these concentrations. Even if a technical solution would be available, this treatment will always be worse to the environment then direct landfilling. There should be a derogation possibility when it can be proven that for some types of waste bringing down the TOC/DOC does not ad to the environmental safety of the landfill site.
PT	• For water discharge of biological treatment, limits for Cl- and SO4- concentration should be higher. • For acceptance of waste at landfills, the loss on ignition (LOI) and total organic carbon (TOC) values should be higher.
ES	• On-site verification of the waste before unloading is considered as useful but not applicable for all incoming loads at the weighbridge as some are closed on top and therefore a check is not possible. • Several limit values such as e.g. the DOC limit value are considered to be very strict.
	• For some kind of waste types (e.g. ashes) the Cl-, SO4- concentrations are considered to be very strict. None of the alternatives to landfill for waste with high levels of chloride and sulphate leaching, is environmentally and economically satisfactory. It is proposed to increase these parameters in order to be able to accept such waste. • There should be a differentiation of carbon (DOC) into biodegradable and non biodegradable waste. Considering that wastes with organic contents that can be recovered, must be recovered

MS	Expert complaints & proposals related to potential modifications of the WAC Decision
	and not landfilled. The proposal is to increase the limit of DOC, or to consider the biodegradable fraction in the DOC. • Decreto 69/2009 de la Generalitat de Cataluña, por el que se establecen los criterios y los procedimientos de admisión de residuos en los depósitos controlados, is an example in ES of applying this approach. • The development of a Guideline for the WAC Decision would be useful in order to facilitate the uniform application of these rules across the EU even if that guide would be mandatory.
SE	• If a higher limit value has been accepted once for a specified waste, (2. Waste acceptance criteria) it has been shown that a higher limit value will not present an additional risk to the environment. Still, the higher limit value is only accepted for a specified waste with a specified origin. The same risk assessment has therefore to be made over and over again when similar waste from other plants is to be assessed, regardless if it is the same parameter (e.g. higher limit value for Cl- from another combustion plant). An acceptance of a higher limit value for a certain parameter ought to be applicable for all kinds of waste at a certain landfill. • For small amounts of waste the WAC Decision requirements should not have to be applied.
UK	• It was mentioned that the TOC limit value with 6 % for hazardous waste to be disposed on landfills for hazardous waste is too strict.

Table 3-7: Overview of divergences of national legislation of criteria for underground storage to the WAC Decision

3.4.2 Identified gaps in the WAC Decision

The major deficits of the WAC Decision that has been identified during the project work is the lack of leaching limits for non-hazardous waste disposed of separately from hazardous waste.

This offers wide room for interpretation and in principle allows Member States to landfill waste on class B landfills which have higher contamination, respectively show higher leaching results than waste acceptable at landfills for hazardous waste. In principle limit values do not to have to be set at all. Practical examples for both cases exist.

Given the fact that provisions concerning isolation from the surrounding environment are less strict than for class C landfills, this might be regarded as problematic and contradictory to the pre-cautionary principle.

Another aspect is the pH limit which is set only for hazardous but not for non-hazardous waste or the lack of a low level limit for the dry matter content.

Asbestos waste is only addressed in the chapter for class B landfills. In this context it is to be questioned whether this means that a disposal of asbestos waste at class C and class A landfills would be an offence of WAC Decision objectives, or whether this is only a matter of classification. In addition it would need to be clarified whether waste used to cover and surround the asbestos waste has to be compliant with any of the WAC Decision limits or not. As it is not included in the chapter stable non-reactive hazardous waste, it could be concluded that WAC Decision leaching limits for class B do not apply.

4 Conclusions and Recommendations

Conclusion on legal implementation of the WAC Decision

The assessment of national legislation shows that the vast majority of the EU-15 Member States has well or even literally transposed the WAC Decision into national legislation. A number of deficits or the current lack of specific legislation in a small group for Member States is partly based on the interpretation that the WAC Decision would be directly applicable at national scale, and such direct applicability would be immanent in a referral to Article 16 and Annex II of the Landfill Directive in national legislation.

Requirements for acceptance procedures and acceptance criteria are largely reflected, however, some deficits remain.

Basic characterisation: Minor deficits relate to aspects of fundamental requirements of basic characterisation. More important is the lack of concrete provisions and specification as concerns testing requirements in terms of determination of compositional range and variability. In this context the obligation to annually renew the basic characterisation as requested in a number of Member States could be regarded as practical means to determine and assess the variability of regularly generated wastes.

As concerns **compliance testing** a full transposition of the WAC Decision wording with a frequency of one year without further specification is the most common way of implementation. Worthwhile to note is the specification in Dutch legislation that a batch leaching test is restricted to situations where leaching results have been identified as critical (key) parameter, the obligation to analyse the full range of substances or the linkage of testing frequency to waste characteristic and waste amounts.

On-site verification: Whereas the control of documents is uniformly adopted into national legislation, the provision for visual inspection and in particular the obligations are concerning on-site sampling and testing have been sometimes varied in National legislation. Whereas the changed provisions for visual inspection can be regarded as of low importance, a lack of a sampling /testing obligation for class A and B landfills might be more important.

As regards **acceptance criteria**, divergences focus on leaching limit values and the total content parameters for additional substances, more stringent limit values for a number of substances, and on additional possibilities to accept higher contamination namely of TOC and DOC or additional restrictions.

More stringent limit values can be regarded as good practice which might be recommended to other Member States. The additional provisions for TOC and DOC in practice may have important impacts and implications on landfilling and thus although potentially reasonable might need to be regarded as not compliant with WAC Decision requirements and should urgently be further discussed in order to reach a coordinated approach.

Although in accordance with the WAC Decision the use the TDS limit instead of chloride and sulphate, or a corresponding ban has a considerable impact on acceptability of waste.

Some MS implemented the WAC Decision by national legislation, but instead of defining therein directly the requested testing methods and corresponding limit values, they refer to national guidance documents (e.g. published by the EPA). Even if the guidelines are indirectly legally regulated as they have to be compliant with the WAC Decision, this could be stated as a minor deficit.

Implementation of requirements for inert waste landfills is well achieved. Some slight variations and extensions of the short list are the most important divergences observed. Examples of good practice comprise additional restrictions for short list waste and more stringent or additional limit values.

Whereas criteria for landfills for non-hazardous waste in total are well implemented there are some fields of potential deficits and problems.

Although in line with WAC Decision provisions the installations of additional subcategories for class B landfills can become problematic if higher limit values than those set in the WAC Decision are set.

Additional specifications as regards the pre-treatment obligation for MSW are not common. Examples of good practice comprise the implementation of more stringent short lists by excluding EWC, the general ban to accept hazardous waste at class B landfills or to landfill biodegradable waste. In single cases pre-treatment is explicitly specified and quantified by means of an AT_4 limit.

Certain deficits remain as concerns criteria for monolithic waste, physical stability and bearing capacity and non-reactivity of stabilised waste, where quite a number of MS did not add further specifications. On the other hand, some countries show a good and more stringent implementation.

For the majority of MS a good level of implementation of the **criteria for landfills for hazardous waste** could be identified as negative divergences exist only for a few countries. Especially examples of good practice of several countries show a focus on more stringent leaching limit values and additional limit values.

Provisions for sampling and testing are implemented by all MS which put in place a corresponding legislation. In compliance with the WAC Decision, a number of countries use their own national standards additionally to the EN standards.

Even if only a few MS currently exploit the possibilities of **underground storage**, almost all countries have implemented very well the corresponding criteria. In large parts the WAC Decision wording was literally adopted to national legislations and only a few exemptions could be identified.

Thus it can be concluded that except of the few countries which do not yet have legislation in place, the need for further specification and amendments is limited to a few topics which are partly already intensively discussed.

Conclusion on practical application of WAC Decision requirements

Being based on a voluntary approach, the impression from site visits certainly correspond more to an overview of good practice in the different Member States.

Taking into account that visited landfills in general represented examples of good practice of waste management for a given landfill category, it can be concluded that a good level of practical application of the procedures and a relatively equal standard has been established in well managed plants in EU-15.

This in particular applies for basic characterisation, whilst there are some weaknesses and divergent interpretation as regards systematic compliance testing. With respect to on-site verification, provisions are well fulfilled as concerns documentary control. On-site sampling is commonly performed at class C landfills but is rarely executed on class A and class B landfills. Visual inspection is performed with a focus on the place of unloading.

Electronic data management systems are commonly applied tools which significantly facilitate the procedures. Standardised forms for basic characterisation normally exist. In addition documents for tracing the waste flow on site are elaborated in particular on hazardous waste landfills. Internal management standards and environmental certification with harmonised quality standards and intensive information transfer, education and training is a common practice especially in large international companies.

All visited landfills in general complied very well with their national legislation and corresponding technical requirements and acceptance procedures.

Technical standards of visited landfills were compliant with 1999/31/EC provisions or even stricter national regulation as concerns geological barrier, separation of cells, gas and leachate collection and superficial coverage.

A considerable number of the visited sites represented integrated treatment plants. An integration of thermal and physico-chemical facilities is in particular established for hazardous waste landfills, whilst non-hazardous waste landfills are often equipped with civic amenity sites and composting facilities.

Nevertheless the amount of biomass entering a class B landfill differs considerably depending on national policy and potential bans.

In this context the idea of “bioreactor” management of a class B landfill as alternative to intensive pre-selection (e.g. MBT) is increasingly favoured in some Member States as means to tackle the biowaste problem.

Gas and leachate collection is common. Energy recovery from Landfill gas in terms of electricity production is applied in many of the landfills receiving biodegradable waste. Heat recovery is less established but is developing.

These conclusions however, do not apply to all landfill sites. In particular small rural sites for inert and hazardous waste still might have difficulties to fully achieve the reported standards.

Visual inspection constitutes the weakest point of control as it is directly correlated to the expertise and motivation of the staff on site. Consequently, the landfill types were visual inspection is the only control instrument because waste is exempted from testing, tend to show a larger range of management quality, and associated risks. Consequent awareness raising and training of the staff is therefore essential.

Conclusion on gaps and deficits in the WAC Decision

Whereas basic requirements of the WAC Decision seem to be well understood and applied, landfill operators would appreciate some additional guidance and clarification of details namely as regards sampling and testing and criteria for compatibility. In addition landfill operators experience problems with a small amount of limit values, so that pragmatic solutions might be helpful. The lack of limit values for non-hazardous waste to be disposed separately from hazardous waste is the major deficit in the WAC Decision,

Based on these conclusions the following recommendations can be proposed:

Recommendation for the Member States

- Amend existing legislation in order to explicitly transpose WAC Decision requirements if not already in place;
- Develop concrete provisions instead of simple referral to Decision 2003/33/EC;
- Concretise requirements as regards testing of variability and compositional range;
- Specify criteria for monolithic (stability, limit values, testing method) waste if not yet established;
- Promote consistent application of acceptance procedures by information and education of landfill operators;
- Exchange good practice and legal approaches with other Member States.

Recommendation for the European Commission

- Develop proposal or guidance for determination of variability and compositional range, monolithic waste, pre-treatment and limit for non-hazardous waste if not landfilled together with hazardous waste;
- Clarify conditions for disposal of asbestos and gypsum waste;
- Provide guidance about proper implementation of the WAC Decision (mandatory elements and format, voluntary "good practice" elements);
- Participate in elaboration of pragmatic solutions for challenging limit values;
- Compile and disseminate information on good practice.

Contact details:

BiPRO GmbH
Grauertstr. 12
81545 Munich, Germany
Phone: +49-89-18979050
Fax: +49-89-18979052
URL: http://www.bipro.de