

COMMISSION OF THE EUROPEAN COMMUNITIES

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Proposal for a
COUNCIL DIRECTIVE
on the landfill of waste

(presented by the Commission)

EXPLANATORY MEMORANDUM

Introduction

The Resolution of the European Parliament of 19 June 1987⁽¹⁾ on the waste disposal industry and old waste dumps has drawn attention to the extent and seriousness of the problems associated with old waste dumps. This Resolution took into consideration the problem of disparities between national policies regarding waste disposal which may lead to distortion of competition.

In 1989, the Communication of the European Commission on a Community Strategy for Waste Management⁽²⁾ focused on the need to harmonize standards for waste management facilities on the basis of a high level of environmental protection, as a preparation of the internal market.

The Council of Ministers adopted in a Resolution of 7 May 1990⁽³⁾ the main guidelines of this strategy, one of which is the optimization of final disposal for waste.

Consequently the Commission is proposing a directive on the landfill of waste to ensure that Member States adopt a homogeneous policy related to landfills and that standards are harmonized throughout the Community.

Objectives

It should be kept in mind that landfilling is the final resort in waste management and that this practice may lead to serious environmental problems of soil and groundwater contamination if not properly dealt with. Besides, due to the harmful residues that sometimes have to be discarded, landfills must keep strict standards in their site selection, development and operation, types of wastes accepted, pre-treatment of these wastes and post-closure supervision.

The primary objective of the Directive is to harmonize, in all Member States of the European Community, the environmental and technical standards for the landfill of wastes to ensure a high level of protection for the environment and particularly for the soil and groundwater resources.

Serious environmental problems about soil contamination have been appearing in several Member States over the last decade due to the existence of old waste dumps among other causes. One of the objectives of this Directive is to prevent the emergence of contaminated sites throughout the Community and therefore help to alleviate any long-term adverse soil contamination problems that would otherwise be irreversible if not controlled in time.

(1) OJ No C 190, 20.7.1987, p. 154.

(2) SEC(89) 934 final, 18.9.1989.

(3) OJ No C 122, 18.5.1990, p. 2.

Differing national policies between the Member States may distort free competition of waste disposal in the internal market, therefore uniform standards are needed to ensure an equal level of environmental protection within the Community.

Another objective that should be considered is the need to minimize landfilling of waste. The promotion of prevention and recycling of waste needs to be practised with the aim of decreasing the amounts of waste to be landfilled. For those wastes which have to be disposed of, the appropriate treatment should be provided in order to reduce to the maximum their potential harmfulness.

The price charged for the disposal of waste by landfilling shall take into account at least all costs involved in setting up, operation and aftercare of the facility. If the real cost of landfill is high, this factor will act as a deterrent for avoidable disposal or as an encouragement for the search of better alternatives in the fields of waste prevention or recycling.

Legal Basis

The legal basis proposed for this Directive is Article 100 a of the Treaty. Article 100a has as objective the approximation of national legislations which might affect the establishment and functioning of the Internal Market. Waste disposal can be very seriously influenced by differing technical standards between landfills, in particular with regard to the costs of disposal and to the environmental effects of the sites. It is therefore considered necessary to adopt standards at a high level of environmental protection, that will be implemented in all Member States, as a measure to:

- a) prevent environmental damage caused by landfills, and
- b) impede the preferential flow of waste towards lower cost disposal sites due to less strict environmental standards, as this would seriously affect the principle of free competition.

COMMENTS TO THE ARTICLES

ARTICLE 1 Field of Application

Wastes as defined in the Council Directive 75/442/EEC on waste, as amended by Council Directive 91/156/EEC of 18 March 1991, whose final destination for disposal is landfill will need to comply with the requirements of this directive.

A landfill is a controlled means of waste disposal onto or into land. Transfer and storage facilities are excluded from this directive because they require other operational procedures.

ARTICLES 2 AND 4 Types of Wastes and Classes of Landfill

For the purpose of clarity, different wastes in this directive are referred to as "types of waste" (Article 2), while different landfills are referred to as "classes of landfill" (Article 4).

Wastes are classified either by origin (municipal, industrial) or by characteristics (hazardous, inert).

In Article 4 landfills are classified in three different classes, for hazardous waste, for inert waste and, a broad in between category, for municipal, non hazardous and other compatible wastes.

The reason for including this later class for municipal, non hazardous and other compatible waste is to broaden the possibilities for the joint disposal of wastes of different origins and characteristics.

The concept of monolandfill is included in this article as a specific disposal solution for particular types of waste. This means that independent of their characteristics, wastes can be better dealt with by the application of specific measures.

Finally, considering that landfills are fully fledged industrial installations, it is possible for the same site to receive a multiple classification if it deals separately with different types of waste. This case could be defined as "multidisposal" landfilling, to be differentiated from joint disposal by the fact that discrete, separate areas are used for the landfilling of different types of waste.

ARTICLE 5 General Requirements for all classes of landfill (Annex I)

This Article deals with the harmonization of requirements to be fulfilled by the different classes of landfills. (See comments on Annex I).

ARTICLES 6, 7 AND 8 Permit procedure

These Articles deal with the application, conditions and content of the permit required for the establishment and operation of a landfill. The permit procedure will be integrated in the procedures already fixed in the framework Directive on waste adding some particular points specific for landfills. The permit may be amended with the agreement of the competent authority and the project shall be compatible with the waste disposal plans established for the region.

ARTICLE 9 Wastes not acceptable for landfill

The purpose of this Article is to define wastes that cannot be accepted in a landfill due to the problems they may cause in the landfill itself or due to the dangers that they might impose on their surroundings and/or on the health of persons.

Liquid waste is only accepted if compatible with other waste or with the operation procedure of the site. A landfill is not to be used as a storage for liquids, as this would substantially increase the waterhead on the soil. This could then unvell the possibility of groundwater contamination and would effect the physical stability of the site.

If liquid waste is to be landfilled, it shall be for the purpose of beneficial action regarding the purification of the liquid wastes because of the processes occurring in the landfill.

The exclusion of oxidizing, explosive or flammable waste is to ensure against any serious accidents that may occur.

The reason for excluding infectious wastes is to protect the health of people as well as to prevent the spread of diseases through other biological vectors living in, or on, the landfill.

Finally, wastes not fulfilling the criteria that make them suitable for landfilling shall not be accepted unless:

- a) they are treated to the extent that they abide by the criteria or,
- b) if they cannot be treated, particular disposal options are designed for these wastes.

An important aspect considered in this directive is that the mixture of different types of wastes, for example, hazardous and inert, in order to reach acceptable criteria for landfilling, due exclusively to the dilution effect is not to be accepted. Wastes can be mixed in joint disposal only if beneficial interactive processes occur between the different types of waste when mixed.

ARTICLE 10 Wastes to be accepted in the different classes of landfill

In order to be able to determine the destination of waste, it is important to use the same acceptance criteria based on the characteristics of the eluate as well as on the compatibility of different types of waste in the case of joint disposal (eluate and compatibility criteria Annex III).

The eluate criteria are fixed by the maximum acceptable concentrations in the eluate of the waste to be disposed of. If hazardous waste fulfills these criteria it will be possible to dispose of it in a landfill for hazardous waste. If the criteria are not fulfilled, the waste will have to be treated. If still there is no possibility for treating the hazardous waste to bring its characteristics within the acceptable limits, there is always the possibility of disposing of the waste in a monolandfill.

Regarding the disposal of wastes in a monolandfill, it should be realized that this practice refers to landfills for any specific type of waste (hazardous, non-hazardous and inert) as long as it is considered appropriate. Thus, depending on the type of waste, the monolandfill will be classified respectively as a hazardous, non-hazardous or inert waste landfill.

There can be waste, regardless of its hazardous or non-hazardous characteristics, whose joint disposal with municipal waste can be compatible or even advisable due to the beneficial interactive processes of chemical, biological and physical nature that occur between the different types of wastes when mixed. This is the concept of joint disposal of wastes as considered in the Directive. The compatibility criteria shall be assigned in order to set guidelines at Community level for the joint disposal of municipal, non hazardous and other compatible wastes.

ARTICLE 11 Waste Acceptance Procedures

This article sets the obligations for the operator and the procedures for accepting waste at the site. An important point is the application of a sampling and analysis programme according to the provisions laid down in Annex III of this directive. Apart from this, the operator shall be responsible for checking and inspecting the waste upon arrival at the site, and for keeping a register of the waste disposed, and, in the case of hazardous waste, he shall keep a register of the precise location of the site.

To facilitate administrative work, the operator shall have the possibility to enter into a contractual agreement with a frequent user of the site.

In the case of non-acceptance of the waste by the operator, the holder shall return it to the producer unless another adequate means of disposal, complying with all necessary requirements regarding environmental protection, can be found.

The responsibility for the acceptance of waste on a landfill falls upon the site operator.

ARTICLE 12 Control Procedures in Operation and Aftercare Phases

These procedures are laid down in Annex IV of this Directive and they are to be carried out by the operator of the site.

If adverse environmental effects from the landfill are discovered it shall be possible to take corrective measures at the expense of the operator.

ARTICLE 13 Closure Procedure

This article sets the conditions and procedures necessary to close down a landfill. The restoration of the natural conditions of the surrounding area and the adoption of preventive measures to avoid any future problems to be caused by a closed site are basic steps to be considered at this point.

The responsibility for the maintenance, monitoring and control in the aftercare phase of the landfill will fall on the operator for a period of up to 10 years, to ensure that the site is or remains safe, or for a shorter period if the competent authority authorises it.

ARTICLE 14 Civil liability of the operator

The operator of a landfill shall be liable under civil law for the damage and impairment of the environment caused by the waste. This civil liability shall be regulated in the framework of the "Council Directive on civil liability for damage caused by waste" already proposed by the Commission⁽⁴⁾, including in it eventual provisions of limitation of this liability. Meanwhile, national legislation on this subject shall be applied.

ARTICLE 15 Existing Landfill Sites

Existing landfills will be permitted to operate as long as the future operation of the remaining part of the site meets the conditions laid down in this Directive. The operator will have up to five years after the directive enters into force to condition his site. Nevertheless, this does not mean that an old operating area should not be corrected as far as possible in order to mitigate its possible negative environmental impact.

(4) OJ No C 251, 4.10.1989, p. 3.

ARTICLE 16 Cost of the Landfill of Waste

Landfilling should not be an unrealistically low priced disposal practice, that is why all costs involved in the landfilling of waste should be reflected, this will encourage the avoidance of landfilling of waste that can otherwise be prevented or recycled.

For the purpose of calculating the price of the landfill of waste the following parameters, not being an exhaustive list, shall be taken into consideration:

- cost of the land
- engineering, legal and administrative costs
- financial costs
- site preparation costs
- operation and maintenance costs
- treatment and conditioning costs
- monitoring costs
- closure and aftercare costs
- contribution to the Landfill Aftercare Fund.

ARTICLES 17 AND 18 Financial Guarantee - Landfill Aftercare Fund

These articles deal with financial instruments to ensure that there are sufficient funds available to cope with any possible damage to the environment during the operating and aftercare phase of the landfill.

The operator shall provide a financial guarantee or an equivalent to it to cover the estimated costs of closure and aftercare operations of the landfill.

The Landfill Aftercare Fund (Article 18) brings forth an additional financial instrument and shall be constituted and administered by the competent authorities in the Member States.

The purpose of this fund is to cover the normal aftercare costs of closed landfills and to cover expenses raised by the necessary prevention or clean up of damage caused by the landfill in case it is not recoupable or not covered by any other financial guarantee.

This fund shall be financed by the operator of the landfill and his contribution will depend on the type of waste and class of landfill as well as the tonnage of waste disposed therein.

In addition to these instruments, Member States may establish or resort to any other appropriate economic instrument, applicable on the disposal of waste, in the framework of a comprehensive waste management policy. Nevertheless, these shall be in accordance with the principles of Community law and with the provisions of the Internal Market.

ARTICLE 19 Obligation to report

In order to set up appropriate waste management policies, the Commission is currently collecting statistics on waste.

That is why this Article requires that the Member States should send to the Commission an annual report on the landfill of waste.

ARTICLE 20 Committee

A Committee, established according to the procedure laid down in the framework directive on waste, will be in charge of approving all the amendments and technical adaptations of the annexes of this directive.

ANNEX I

1. Location

In view of the great amount of conditioning factors affecting the location of a landfill no limiting conditions are proposed in this point. It should be noted though that the location of the landfill is closely related to its environmental impact. This means that a thorough study of the conditions of the proposed site has to be carried out, possible environmental hazards identified and appropriate preventive measures proposed in the landfill project.

2. Roads and Service Areas

The importance of this point lies in the fact that the whole site, not just the area where wastes are to be deposited, must comply with high environmental protection standards. Measures shall be taken to prevent nuisances originating from the landfill on access roads.

3. Fencing

Fencing surrounding the landfill area must provide at all times, the necessary protection of the site and prevention of access after operating hours.

4. Landscaping

With the addition of this point, it is hoped to promote the avoidance of negative visual impact as well as improving the image of landfill.

5. Site Identification

The policy of transparency and right of information is portrayed in this point. This policy is put forth by making available to the public and landfill users the essential information on the site operation and characteristics.

6. Control of Access

A landfill site is a sensitive operating facility as well as an industrial installation. Therefore, appropriate access control measures on the people, vehicles and wastes coming into the site shall be taken and a qualified person shall always be present during operating hours to control the on-going procedures of the site.

7. Water Control and Leachate Management

The issue of water entering into a landfill site is extremely important as it concerns not only the formation of leachates but the stability of the site as well. This concern justifies any measures taken to control water entering the site. Water and leachate emanating from the landfill shall be collected and treated according to the appropriate standards required for its discharge, unless an Environmental Impact Assessment reveals that these operations are not required.

8. Protection of Soil and Ground Water

The importance of the protection of soil and ground water has already been stressed as being the primary objective of this Directive. The measuring tool which has been taken as a reference value is the minimum permeability coefficient (K) to be attained in the landfill base and sides.

This coefficient shall be obtained through natural conditions or artificially by engineering measures (compacted clays, ...) and/or by the installation of lining systems. Limiting values for the permeability coefficient shall not apply to the inert waste landfill because, due to the characteristics of the waste disposed, it does not represent a potential hazard for the environment.

9. Gas Control

The production of methane and other gases (biogas) in a biologically active landfill may create serious problems if the gases are not properly dealt with, as they can concentrate in gas pockets within the landfill or migrate towards nearby buildings with the probability of causing accidents through explosions.

Depending on the size and level of activity of the landfill, the economic exploitation of biogas should be taken into consideration, and only if not economically viable, should the biogas be burnt in a torch or vented into the atmosphere, which would be the case only for very small landfills.

10. Nuisances

This point basically deals with the idea of good housekeeping. The landfill should develop a good image as well as being a good neighbour and abide to any rules needed to obtain this image.

11. Control of Stability

The main message brought forth in this point marks one of the most visible differences between a landfill and a dump. A landfill is an engineering operation, waste is not a cohesive material and thus it is subject to settling or change in movement. Therefore, its proper placement must be considered to avoid slides of masses of waste which could cause danger to persons, property and surrounding environment.

ANNEX II

This annex deals with the basic information required to apply for a permit either for the establishment, operation or closing of a landfill as well as with the conditioning plan of an existing landfill.

These requirements are in accordance with the general contents of the documents required in the Member States for the approval of a landfill project.

The importance of this annex lies in the fact that it harmonizes, at European Community level, the requirements for a permit procedure in the different circumstances mentioned above. It is very important for the competent authority at the time of deciding on a landfill permit, to assess carefully the feasibility of the landfill through a harmonized procedure dealing with the engineering details of the project including an environmental impact assessment. As for the viability and the aftercare period of the landfill, the applicant shall provide appropriate information on the closure and aftercare procedures as well as economic information concerning the project.

ANNEX III

The purpose of this annex is to provide a set of guidelines enabling to direct any type of waste to the appropriate class of landfill and to harmonize technical characteristics of landfills that will ensure the utilisation of the same criteria for the acceptance of waste. The waste acceptance criteria and control procedures will be fixed in function with the characteristics of the eluate and of the compatibility of different types of waste in the cases of joint disposal (eluate and compatibility criteria).

Joint disposal is the conscious deposition of waste of different origins or characteristics with municipal or other compatible wastes to achieve specified objectives, a key element of which is to take full advantage of attenuation and degradation processes inherent in the landfill site. When properly managed, joint disposal may be regarded as a safe and efficient disposal option for many hazardous wastes. This practise requires special precautions and management of all operations to ensure that it is both safe and environmentally acceptable. Therefore it is necessary to carefully assess the hazardous wastes destined for joint disposal and only those wastes which are compatible with municipal waste should be accepted for joint disposal. This is done with the compatibility criteria.

ANNEX IV

This Annex, dealing with the control procedures in the operation and the after-care phases, guarantees that the possible effects of the existence and operation of a landfill are cautiously monitored and measures can be taken in case action is needed to prevent any adverse environmental effect.

Monitoring and control during operation and after-care phases is also important to improve our knowledge of the behaviour of the landfills in relation with the wastes deposited and with all the external factors that may have an effect on them.

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Annex I: General requirements for all classes of landfill

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Annex II: Basic information to provide in the case of:

- A) The establishment and operation of a landfill.
- B) The conditioning plan of an existing landfill.
- C) The closing of a landfill.

Annex III: Waste acceptance criteria and procedures

Annex IV: Control procedures in operation and aftercare phases

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THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Article 100a thereof,

Having regard to the proposal from the Commission⁽¹⁾,

In cooperation with the European Parliament⁽²⁾,

Having regard to the opinion of the Economic and Social Committee⁽³⁾,

Whereas the Resolution of the Council of 7 May 1990 on Waste Policy⁽⁴⁾ adopts the Community Strategy document and invites the Commission to propose criteria and standards for disposal of waste by landfill;

Whereas there is a need, in a Community without internal frontiers, to harmonize the technical standards for the landfill of waste on a high level of environmental protection;

Whereas it is considered necessary to take the appropriate measures to avoid the abandonment, dumping or uncontrolled disposal of waste;

Whereas disparities between technical standards for the disposal of waste by landfill might give rise to preferential disposal of waste in facilities with low standards of environmental protection, where disposal costs are inferior, and thus create a potentially serious threat to the environment, due to unnecessarily long transport of the wastes as well as to inappropriate disposal practices;

(1) OJ No

(2) OJ No

(3) OJ No

(4) OJ No C 122, 18.5.1990, p. 2.

Whereas any disparity between the laws and technical standards of the Member States on the landfill of waste can distort the conditions of competition and thereby directly affect the establishment and functioning of the internal market;

Whereas the disparity between technical standards and control and operating procedures in landfills gives rise to differences in the cost of waste disposal and thus affect the conditions of competition;

Whereas in view of what is said above it is necessary to clearly define the classes of landfill to be considered and the types of waste to be accepted in the different classes of landfill;

Whereas it is necessary to clearly point out which are the general requirements with which landfills must comply, dealing with location, development, control and protective measures to be taken, in particular against the pollution of groundwater by leachate infiltration into the soil;

Whereas it is necessary to harmonize the permit procedures for all classes of landfills according to the general licensing requirements already set down in Council Directive 75/442/EEC of 15 July 1975⁽¹⁾ on waste, as amended by Directive 91/156/EEC⁽²⁾, and to the particular aspects of landfill as required in this Directive;

Whereas it is necessary to avoid disparities in the waste acceptance procedures in different landfills, and for this a homogeneous system of waste sampling, characterization and analysis will have to be fixed;

Whereas it is necessary to establish common control procedures during the operation and aftercare phases of a landfill in order to identify any possible adverse environmental effect of the landfill and take the appropriate corrective measures;

(1) OJ No L 194, 25.7.1975, p. 39.

(2) OJ No L 78, 26.3.1991, p. 32.

Whereas it is necessary to define when and how a landfill should be closed and the obligations of the operator on the site during the aftercare period;

Whereas it is necessary to regulate the conditions in which existing landfills shall operate and the measures to be taken for their adaptation to the conditions laid down in this Directive;

Whereas an old operating site should be corrected as far as possible in order to mitigate its possible negative environmental impact;

Whereas in compliance with the polluter pays principle the price charged for waste disposal in a landfill shall cover at least all the costs involved in the setting up, operation and aftercare of the facility;

Whereas in order to provide sufficient funds for the control of a closed site it is proposed to create a "Landfill Aftercare Fund" to assure that closed landfills are properly monitored during the aftercare phase and appropriate curative action can be taken if needed;

Whereas, with a view to following the evolution of waste disposal by landfill, it is considered necessary to provide data,

HAS ADOPTED THIS DIRECTIVE:

Article 1

Field of application

1. Member States shall apply this Directive to any landfill as defined in Article 3(e).
2. Transfer stations as defined in Article 3(g) and facilities for the storage of waste as defined in Article 3(h) shall be excluded from the scope of this Directive.

Article 2

Types of waste

For the purposes of this Directive 'waste' means any substance or object which is covered by Directive 75/442/EEC.

According to its origin, waste is classified as:

- 'municipal waste';
- 'industrial waste'.

According to its characteristics, waste is classified as:

- 'hazardous waste';
- 'non-hazardous waste';
- 'inert waste'.

Article 3

Definitions

For the purposes of this Directive:

- (a) "municipal waste" means domestic refuse, as well as commercial or trade refuse and other waste which, because of its nature or composition, is similar to domestic refuse;
- (b) "industrial waste" means waste arising from manufacturing or industrial activities or processes;
- (c) "hazardous waste" means any waste which is covered by Council Directive 78/319/EEC of 20 March 1978 on toxic and dangerous waste⁽¹⁾;

(1) OJ No L 84, 31.3.1978, p. 43.

- (d) "inert waste" means waste that, when deposited into a landfill, does not undergo any significant physical, chemical or biological transformations and which complies with the eluate criteria set out in Annex III;
- (e) "landfill" means a waste disposal site used for the controlled deposit of the waste onto or into land;
- (f) "mono landfill" means a landfill site or a part of it where only one defined type of waste is deposited, meaning by this waste which is comparable with respect to origin, composition, and the characteristics of their leachates;
- (g) "transfer station" means a facility where waste is unloaded in order to permit its preparation for further transport for recovery, treatment or disposal elsewhere;
- (h) "storage" means the controlled temporary deposit of waste prior to recovery, treatment or disposal. Waste to be stored for more than one year (long-term storage) will have to be stable, non-reacting waste, otherwise it will have to be previously stabilized. Permanent or indefinite storage shall be considered as equivalent terms to landfill;
- (i) "treatment" means the physical, chemical or biological processes that change the characteristics of the waste in order to reduce its volume or hazardous nature, facilitate its handling or enhance recovery;
- (j) "leachate" means any water percolating through the deposited waste and emitted from or contained within a landfill;
- (k) "landfill gas" means all the gases generated from the landfilled waste;

(l) "eluate" means the solution obtained by a simulated laboratory leaching test;

(m) "operator" means the natural or legal person responsible for a landfill;

Article 4

Classes of landfill

1. Depending on the types of waste to be deposited the following classes of landfill will be considered within the scope of this Directive:
 - landfill for hazardous waste,
 - landfill for municipal and non-hazardous wastes and for other compatible wastes, as defined in the compatibility criteria set out in Annex III,
 - landfill for inert waste.
2. Each landfill shall be classified according to the terms of this Directive.
3. A landfill may receive a multiple classification, provided that the disposal operations are carried out in separate areas of the site, and that each of these areas complies with the specific requirements set for that class of landfill.
4. Independently of their type, wastes can be assigned to a mono-landfill, as defined in Article 3 (f). Mono-landfills will have to comply with the requirements fixed for the class of landfill to which they belong, according to the type of waste deposited in them.

Article 5

General requirements for all classes of landfill

A landfill must comply with the necessary requirements set out in Annexes I, III and IV in order to avoid environmental damage.

Article 6

Application for a permit

The application for a landfill permit, as required in Article 9 of Directive 75/442/EEC shall fulfil at least the requirements and procedures as specified in Annex II.

Article 7

Conditions of the permit

Member States shall ensure that:

1. The competent authority shall not issue a landfill permit unless:
 - a) the application is complete and in accordance with this Directive,
 - b) the applicant (owner and/or operator of the facility) responds to the appropriate technical and financial specifications required to establish and operate a landfill,
 - c) the landfill project complies with all the requirements laid down in this Directive,
 - d) The landfill project is compatible with the waste disposal plans established pursuant to Article 7 of Directive 75/442/EEC.

2. Prior to the commencement of disposal operations, the competent authority shall carry out an inspection of the site in order to ensure that it complies with the conditions of the permit.

Article 8

Content of the permit

1. In accordance with the provisions set out in Article 9 of Directive 75/442/EEC, the landfill permit shall state at least the following:
 - a) the list of defined types of waste to be permitted or excluded in the landfill;
 - b) the requirements for the landfilling operations and control procedures as well as for the closure and aftercare operations.
2. The permit may be revised. In order to revise a permit, the procedures set in Articles 6, 7 and 8(1) of this Directive shall apply.

Article 9

Waste not acceptable for landfill

Member States shall ensure that:

1. The following wastes shall not be accepted in a landfill:
 - wastes in liquid state, unless compatible with the type of wastes acceptable in each individual landfill, and with the operating procedure of the site (Annex IV: Water Balance);
 - wastes which, in the conditions of landfill, are explosive, oxidizing, highly flammable or flammable, as defined by Directive 78/319/EEC;

- waste arising from medical or veterinary establishments which is infectious as defined by Directive 78/319/EEC;
 - any other type of waste which does not fulfil the criteria specified in Annex III, unless it is assigned to a mono-landfill as indicated in Article 10(4) of this Directive.
2. No dilution of waste in order to meet the waste acceptance criteria shall be permitted either before or during the landfill operations.

Article 10

Waste to be accepted in the different classes of landfill

Member States shall ensure that:

1. With the objective of guiding the different types of waste to be disposed of to the appropriate class of landfill the assessment of the characteristics of the waste with respect to landfilling requirements will be made by reference to:
 - the origin of the waste,
 - the composition of the waste,
 - the leaching and compatibility characteristics of the waste with respect to the eluate and compatibility criteria set out in Annex III.
2. Hazardous wastes that fulfil the eluate criteria set out in Annex III shall be assigned to a hazardous waste landfill unless, if compatible with municipal waste, they are assigned to a landfill for municipal and non-hazardous wastes and for other compatible wastes.

3. Hazardous wastes not fulfilling the eluate criteria shall be treated before disposal in a hazardous waste landfill.
4. Hazardous wastes not fulfilling the eluate criteria set out in Annex III and which cannot be treated, or are not compatible for joint disposal with municipal waste, or any other type of wastes of a precise type, origin or composition, can be assigned to a mono-landfill. Specific requirements shall be fixed by the competent authority for these particular landfills according to the nature of the wastes to be deposited.
5. Landfill for municipal, non-hazardous and other compatible wastes landfill sites can be used for:
 - a) municipal waste,
 - b) non-hazardous wastes of any other origin,
 - c) liquid wastes and sludges compatible with the landfilled wastes and with the operation procedure of the site (Annex IV: water balance). Particular precautions shall be taken when disposing of liquid wastes to prevent the formation of aerosols as well as to promote uniform trickling and thus avoid the occurrence of preferential paths through the landfill,
 - d) any other wastes or mixture of wastes compatible with the landfilled wastes, if their joint disposal supposes any advantage with respect to waste management and environmental protection, due to the beneficial interactive processes that occur between the different types of waste when mixed. (Compatibility criteria: Annex III).

6. Inert waste landfill sites shall be used only for inert waste that complies with the criteria set out in Annex III. If necessary, in order to meet the criteria, waste with a majority of inert components shall be previously sorted or treated to separate those components that might give rise to any physical, chemical or biological transformation.

Article 11

Waste acceptance procedures

Member States shall take measures in order that:

1. The operator of a landfill shall accept waste only if, before or at the time of delivery, the holder can show, by means of the appropriate documents, that the waste in question can be accepted in that site, according to its class and the conditions set in the permit, and that it fulfils the acceptance criteria (Annex III).
2. The operator of a landfill shall be responsible for :
 - a) checking of the waste documentation;
 - b) visual inspection and control of the waste at the entrance and at the tipping front;
 - c) the application, if required according to the provisions laid down in Annex III, of a sampling and analysis programme of the waste delivered. This programme can be carried out by an approved laboratory contracted by the operator or by the operator himself if he possesses adequate and approved laboratory facilities;

- d) keeping a register of the quantities and characteristics of the wastes deposited, indicating origin, date of delivery, producer, and, in the case of hazardous waste, the precise location on the site;
 - e) reporting on a yearly basis to the competent authority on the types and quantities of waste disposed of and on the results of the control programme, as required in this Article and in Annex IV.
3. When the producer or the holder of the waste is a frequent user of the landfill, he must reach a written contractual agreement with the operator of the site in order to deliver his waste to the landfill. The document shall describe the general characteristics of the waste delivered.
 4. The operator of the landfill shall always provide written justification of each delivery accepted on the site. This document can be considered as evidence of the disposal of the waste and also as an agreement by single users of the landfill.
 5. If a waste is not accepted at a landfill the holder shall return it to the producer unless another adequate means of disposal, complying with all the necessary requirements, can be found.
 6. The responsibility for the acceptance of waste on a landfill falls upon the site operator.

Article 12

Control procedures in operation and aftercare phases

Member States shall take measures in order that:

1. The operator of a landfill shall carry out during the landfill operation and aftercare phases a control programme as specified in Annex IV;

2. The operator shall notify the competent authority if any adverse environmental effects are discovered as a result of the control procedures and, in all cases, the operator must notify the competent authority of the nature and timing of the proposed measures to be taken;
3. Corrective measures shall be taken, at the expense of the operator, if adverse environmental effects from the landfill operation are discovered. These measures may be subject to direction by the competent authority and may be carried out by that authority if the operator does not carry them out himself;
4. Qualified laboratories responsible for the quality control of the analytical operations of the control procedures are designated.

Article 13

Closure procedure

Member States shall ensure that:

1. A landfill or part of it shall start the closure procedure :
 - a) when it has reached its capacity, that is, when the definitive height of the waste deposited reaches the height defined in the landfill project required for the permit or expressed in it, or
 - b) by decision of the owner of the site, with the authorization of the competent authority, or
 - c) by decision of the competent authority.

Whatever the case the competent authority has to justify its decision.

2. A closed landfill shall always receive a final cover in order to accommodate the site to its future uses and integrate it in the surrounding landscape.

The type and characteristics of the cover to be applied shall take into consideration the class of landfill, the types of waste deposited and the particular characteristics of the site in order to control its further development:

3. Prior to the commencement of the total or partial closure of a landfill, the operator shall present to the competent authority the information required in Annex II and in particular on the measures to be provided for the monitoring and control of surface run-off water, gas and leachate emissions from the landfill, and for the protection and monitoring of groundwater as indicated in Annex IV.
4. A landfill or part of it may only be considered as definitely closed after the competent authority has carried out a final on-site inspection and has communicated to the operator its permit for the closure.
5. After a landfill has been definitively closed, the operator shall be in charge of its maintenance, monitoring and control in the aftercare phase for a period of 10 years or for a shorter period if the competent authority authorizes it.

Article 14

Civil liability of operator

The operator shall be liable under civil law for the damage and impairment of the environment caused by the landfilled waste, irrespective of fault on his part.

Article 15

Existing landfill sites

Member States shall ensure that:

1. Landfills which have been granted a permit or are already in operation at the time of notification of this Directive, may not continue to operate unless they comply with the provisions set out in points 2 and 3;
2. To be able to continue to operate, the operators of the sites referred to in point 1 shall apply to the competent authority for a confirmation of their permit or, in the event that the facility does not comply with the terms of this Directive, for the issue of a new or revised permit. The competent authority shall not grant the permit unless the future operation of the remaining part of the site meets the conditions laid down in this Directive;
3. Within a period of five years after the date of implementation of this Directive:
 - a) the operator of a landfill shall, if required, prepare and present to the competent authorities, for its approval, a conditioning plan for the site supplying the information required in Annex II,
 - b) the competent authorities shall consider the demand and reach a definite conclusion,
 - c) the operator shall carry out the conditioning plan of the site;
4. If after five years after the date of implementation of this Directive there are previously existing landfills which do not have a permit for continuing operations, the competent authorities shall take the appropriate measures for the closure of those sites.

Article 16

Cost of the landfill of waste

Member States shall ensure that the price to be charged for the disposal of any type of waste in a landfill shall cover at least all the costs involved in the setting up and operation of the site, as well as the estimated costs of the closure and aftercare of the facility.

Article 17

Financial guarantee

Member States shall ensure that, at the time of receiving a permit, the operator provides, by whichever means, a financial guarantee or any other equivalent, fixed by the competent authority, whose purpose shall be to cover the estimated costs of the closure procedures and aftercare operations of the landfill. This guarantee shall be kept as long as the operator is in charge of the maintenance and aftercare operations of the site.

Article 18

Landfill Aftercare Fund

1. Member States shall ensure the establishment of one or more "Landfill Aftercare Funds" whose structure is to be fixed by the competent authorities.

2. The purpose of these funds shall be:
 - a) to cover the normal aftercare costs of closed landfills,
 - b) to cover the expenses originated by the operations necessary to prevent or cure the damage to the environment produced by the disposal of waste in case it is not otherwise recoupable or not covered by insurance or financial guarantee.
3. The fund shall not cover the costs that can be directly charged to the landfill operator as long as he is liable.
4. The operator of each landfill shall contribute to the "Landfill Aftercare Fund" in the light of the class of landfill and of the types and tonnage of the wastes landfilled. The financial guarantee set in Article 17 does not free the operator from contribution to the Fund.

Article 19

Obligation to report

1. Each year, and for the first time on ..., Member States shall forward to the Commission a report on the landfill of waste containing the information necessary for the Commission to evaluate the compliance with the terms of this Directive.
2. On the basis of the report referred to in paragraph 1, the Commission shall publish a consolidated report every three years, and for the first time on....

Article 20

Committee

The amendments necessary for adapting the Annexes to this Directive to scientific and technical progress and proposals of standardization about control, sampling and analysis methods in relation to the landfill of waste, shall be adopted in accordance with the following procedure.

The Commission shall be assisted by a committee composed of the representatives of the Member States and chaired by the representative of the Commission.

The representative of the Commission shall submit to the committee a draft of the measures to be taken. The committee shall deliver its opinion on the draft within a time limit which the chairman may lay down according to the urgency of the matter. The opinion shall be delivered by the majority laid down in Article 148(2) of the Treaty in the case of decisions which the Council is required to adopt on a proposal from the Commission. The votes of the representatives of the Member States within the committee shall be weighted in the manner set out in that Article. The chairman shall not vote.

The Commission shall adopt the measures envisaged if they are in accordance with the opinion of the committee.

If the measures envisaged are not in accordance with the opinion of the committee, or if no opinion is delivered, the Commission shall, without delay, submit to the Council a proposal relating to the measures to be taken. The Council shall act by a qualified majority.

If, on the expiry of a period of three months from the date of referral to the Council, the Council has not acted, the proposed measures shall be adopted by the Commission.

Article 21

Enforcement

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive within one year of its notification. They shall immediately inform the Commission thereof.

When Member States adopt these measures, these shall contain a reference to this Directive or shall be accompanied by such reference on the occasion of their official publication. The procedure for such reference shall be adopted by Member States.

2. Member States shall communicate to the Commission the texts of the provisions of national law which they adopt in the field covered by this Directive.

Article 22

This Directive is addressed to the Member States.

Done at Brussels,

For the Council
The President

INDEX OF ANNEXES

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II. Basic information to provide in the case of:

- A. The establishment and operation of a landfill.
- B. The conditioning plan of an existing landfill.
- C. The closing of a landfill.

III. Waste acceptance criteria and procedures.

IV. Control procedures in operation and aftercare phases

ANNEX I

GENERAL REQUIREMENTS FOR ALL
CLASSES OF LANDFILLS

1. Location

1.1 The location of a landfill must take into consideration requirements dealing with :

- a) the distances from the boundary of the site to residential and recreation areas, roads and waterways, water bodies and other industrial, agricultural or urban sites.
- b) the existence of groundwater or nature protection zones in the area.
- c) the hydrogeological conditions of the area.
- d) the risk of flooding, subsidence, landslides or avalanches in the site.
- e) the protection of the natural or cultural patrimony of the area.

1.2 The landfill can be authorised if the characteristics of the site with respect to the above-mentioned requirements, or the corrective measures to be taken, when considered in an environmental impact assessment in the meaning of Directive 85/337, indicate that the landfill does not pose a serious environmental risk.

2. Roads and service areas

2.1 Access to a landfill shall be planned in such a way that it creates minimal hindrance to existing public roads.

2.2 The landfill shall be equipped so that dirt originating from the site is not dispersed on to public roads.

2.3 All roads and service areas within the boundary of the landfill must be built and maintained to comply with the water control and soil and groundwater protection measures required for the site itself.

3. Fencing

3.1 The landfill shall be surrounded by fencing sufficient to prevent free access to the site. The gates shall be locked outside operating hours.

4. Landscaping

4.1 Measures shall be taken in order to reduce the visual impact of a landfill, in particular when easily visible from residential areas, recreation areas and roads.

5. Site Identification and Information

5.1 At the entrance of a landfill an identification and information board must be provided displaying the following information :

- name and class of the site
- name of the owner and/or operator
- licensing identification
- operating times
- contact and emergency telephone numbers
- authority responsible for the operating permit and control of the site.

5.2 The additional information must always be available to the public, on request :

- types of wastes for which the site has received an operating permit.
- tariffs to be applied for the depositing of waste on the site.

6. Control of access and operation

6.1 An appropriate system for control of access must always be provided at the entrance of the site.

6.2 All waste delivered shall always be controlled on its

- origin
- type and characteristics
- quantity (weight or volume)
- the appropriate identification documents, if required

6.3. During operating hours, a suitably qualified person in charge of the landfill operations must always be present

7. Water control and leachate management

7.1 Appropriate measures shall be taken in order to control surface and/or groundwater entering into the landfilled waste.

7.2 All water or leachate emanating from the landfill shall be collected unless, through an Environmental Impact Assessment, it is determined that collection is not required.

7.3 Contaminated water and leachate collected from the landfill shall be treated to the appropriate standard required for its discharge.

8. Protection of soil and groundwater

8.1 A landfill must meet the necessary conditions, naturally or artificially achieved, to prevent pollution of the soil or groundwater.

8.2 The non saturated geological formations constituting the substratum of the landfill base and sides shall satisfy the following permeability and thickness requirements.

Maximum values of the permeability coefficient, K (m/s), for a substratum thickness of 3 m measured under conditions of water saturation:

- Landfill for hazardous waste :

$$K = 1.0 \times 10^{-9} \text{ m/s}$$

- Landfill for municipal and non hazardous wastes and for other compatible wastes:

$$K = 1.0 \times 10^{-9} \text{ m/s}$$

- Landfill for inert waste :

$$K = \text{no limit value}$$

8.3 The method to be used for the determination of the permeability coefficient for landfills, in the field and for the whole extension of the site, is to be developed and approved by the Committee set up in Article 20 of this directive.

8.4 Where these conditions, or other equivalent ones, are not met naturally, engineering measures shall be taken to achieve at least the same level of safety.

9. Gas control

9.1 Appropriate measures shall be taken in order to control the accumulation and migration of landfill gas (Annex IV).

9.2 Landfill gas shall be collected and properly treated and preferably used. This obligation applies to biologically active sites receiving or having received more than 10 000 metric tons of wastes per annum.

10. Nuisances

10.1 Measures shall be taken to prevent nuisances arising from the landfill through :

- emission of odours and dust
- wind blown materials
- noise and traffic
- birds and vermin
- formation of aerosols.

11. Control of stability

11.1 To provide for stability of the mass of waste and associated structures, particularly in respect of avoidance of slippages, the emplacement of waste on the site shall take place under suitable systems of quality assurance.

ANNEX II - Basic information to provide in the case of:

- A) The establishment and operation of a landfill
- B) The conditioning plan of an existing landfill
- C) The closing of a landfill

When applying for a permit, the documents to be presented shall adjust to and focus on the particular situation of the site, in function of the alternative (A, B, C) considered.

The basic information to provide shall be the following:

1. Complete identification of the applicants.
2. Description of the types and quantities of wastes to be deposited (A,B) or that have been deposited (B,C)
3. Waste management capacity (daily, monthly, yearly) for which the facility is projected
4. Report with a comprehensive description of the site including :
 - Situation and access
 - Boundaries and topography
 - Geological and hydrological characteristics of the area
 - Local meteorology
5. Engineering details of the project including the development, conditioning and/or closing of the site:
 - Phases of the project
 - Access, fencing and site roads
 - Pollution prevention and abatement methods envisaged
 - Site preparation and provision of services
 - Complementary installations.

6. Operation and control plan for the site including :

- Phasing and description of the operations
- Water, leachate and gas control measures
- Measures for the control of environmental nuisances
- Operating times
- Access control and waste acceptance procedures
- Equipment to be utilized
- Personnel list indicating qualifications, duties and responsibilities
- Monitoring and maintenance procedures
- Operational and safety rules and emergency procedures

7. Plan for the closure and aftercare procedures including :

- Final capacity and expected operational period of the facility
- Final contours and topography of the site
- Final restoration plan
- Phases for partial closure and restoration of filled-up areas
- Aftercare control measures

8. Environmental impact assessment in the meaning of Directive 85/337/EEC

9. Economic information on the project including estimations of the initial :

- Capital investment
- Operational costs
- Charges

Following submission of the application for a permit, the competent authorities:

- a) may, within a period of three months, ask for additional information, modifications of the project, or for an alternative plan
- b) shall reach a definite conclusion within a reasonable period.

ANNEX III - WASTE ACCEPTANCE CRITERIA AND PROCEDURES.

III.1 - INTRODUCTION.

In order to harmonize technical characteristics of landfills it is of great importance that all sites use, if only for comparison purposes, the same criteria for the acceptance of waste. This means that homogeneous sampling and control procedures will have to be fixed and all wastes be subject to them.

For the purpose of this Directive waste acceptance criteria and control procedures will be fixed in function of the characteristics of the eluate and of the compatibility of different types of waste in the cases of joint disposal (Eluate and compatibility criteria).

No matter which are the sampling and analysis methods selected or the parameters to measure, it is to be realized that the tests upon which acceptance criteria are based will never reproduce the exact behaviour of the wastes in the landfill but they will serve as the measuring stick against which the characteristics of the wastes are tested. This means that, in spite of the existence of different sampling and analysis methods, or the relative importance granted to different parameters, a common reference method will have to be fixed as described in this annex.

III.2 - GENERAL PRINCIPLE.

All wastes discharged into a landfill will have to be previously characterized according to the requirements of this annex.

For any waste whose origin is known and whose characteristics and composition are defined, the compulsory sampling and analysis can be substituted by a periodical random sampling and analysis programme.

III.3 - SAMPLING.

Definitions :

A.- Homogeneous waste :

All types of waste which at the time of sampling, are liquid or can be pumped and whose characteristics are the same throughout the whole mass, as well as those wastes whose homogeneity can be visually established.

Heterogeneous waste :

All other wastes.

B.- Representative sample :

A sample is to be considered as representative if the small amount of material weighed out for the analysis has the same average composition as the large mass from which it is derived. Reference : General guidelines on sampling technology, ISO 5667-2-1988.

Number of samples and amounts to be taken

1.- For wastes not delivered in containers.

- a) For homogeneous waste : one sample of 1000 g or ml, per delivery.
- b) For heterogeneous waste : one representative sample of 1000 g or ml, per 5 tons of waste or part thereof.

2.- For wastes delivered in containers.

Figures are valid for containers with the same content. The waste is considered homogeneous at the time of sampling. If the containers are emptied into a collecting tank, the cumulative sample can be taken from the tank.

Weight per container	Weight and number of containers to be sampled for a laboratory sample
< 5 kg	Sufficient for a cumulative sample of at least 1 kg taken from at least x [1] containers
> 5 kg	Sufficient for a cumulative sample of between 1-2.5 kg taken from at least x [1] containers

¹ where : $x = \sqrt{n} + 1$, being n the total number of containers.

3.- Municipal waste.

It is considered necessary to regularly sample these wastes as there is a need to evaluate the changes in composition in order to be able to take appropriate action in advance or as an alternative to landfilling, e.g.: prevention of contamination, selective collection, recycling, etc.

- Waste from households : sampling shall be done at random from all types of origins of the waste in order to determine the percentage composition (organics, metals, etc.), calorific value, heating residue, etc.
- If containers appear with unknown types of waste, these shall undergo independent sampling as in point 2.
- Waste from commerce, offices or public institutions shall be described by the producer. Analytical testing will be done only to allow a complete evaluation or if the declaration is not adequate.

III.4 - CONTROL PROCEDURES : ELUATE CRITERIA.

(Not to be applied to municipal waste).

ELUATE CRITERIA.

Numerous physico-chemical and biological processes govern the production and composition of landfill leachates. In general the composition of leachates will be a function of the types and age of waste deposited, the prevailing physico-chemical conditions, the microbiology and the water balance of the landfill. Although numerous studies have been devoted to the evaluation of the relationship between laboratory tests and the fate of leachates, the scarcity of true information on long term is outlined. Nevertheless, the potential to severely affect water resources by leachates exists and should be prevented. The proposed eluate tests hereunder, have no other aim than providing a qualitative information on the composition of percolating waters and the nature of the mobilized potentially toxic substances. Reference : Etude bibliographique sur les lixiviats produits par la mise en décharge de déchets industriels, 4 volumes, EEC-XII-ENV/20/86.

Treatment of the samples :

The original structure of the sample used should be maintained as far as possible ; large parts should be crushed. The proposed analytical method is DIN 38414-S4 (october 1984 issue) with the following additions and/or simplifications :

- A wide-necked glass bottle (10 cm diameter) should be used ;
- Shake, rotating bottle by 180° once per minute for 24 hours ;
- Centrifuge ; 250 µl filter syringes with 0,45 µm filters should be used for sampling.

Assignment values :

This table fixes the ranges by which wastes will be characterized for the purpose of landfilling according to the composition of their eluates :

- Wastes whose eluate concentration is in the range fixed for hazardous wastes will be considered as such with respect to landfilling. For eluate concentrations higher than the maximum values fixed, hazardous wastes will have to be treated prior to landfill, unless compatible for joint disposal with municipal waste, or, if treatment is not possible, destined to a mono-landfill.
- Wastes whose eluate concentration is not above the maximum values fixed for inert wastes will be considered as such.
- Wastes whose eluate concentration falls in the range between inert wastes and the minimum value for hazardous wastes will be considered non hazardous.

		HAZARDOUS waste range	INERT waste			HAZARDOUS waste range	INERT waste
1.01	pH value	4-13	4-13	1.11	phenols...	20-100 mg/l	< 10 mg/l
1.02	TOC.....	40-200 mg/l	< 200 mg/l	1.12	fluoride...	10-50 mg/l	< 5 mg/l
1.03	arsenic ^{III}	0,2-1,0 mg/l	< 0,1 mg/l the total of these metals : <5 mg/l [1]	1.13	ammonium	0,2-1,0 g N/l	< 50 mg/l
1.04	lead.....	0,4-2,0 mg/l		1.14	chloride...	1,2-6,0 g/l	< 0,5 g/l
1.05	cadmium	0,1-0,5 mg/l		1.15	cyanide [2]	0,2-1,0 mg/l	< 0,1 mg/l
1.06	chromium ^{VI}	0,1-0,5 mg/l		1.16	sulphate [3]	0,2-1,0 g/l	< 1,0 g/l
1.07	copper.....	2-10 mg/l		1.17	nitrite.....	6-30 mg/l	< 3 mg/l
1.08	nickel.....	0,4-2,0 mg/l		1.18	AOX [4].....	0,6-3,0 mg/l	< 0,3 mg/l
1.09	mercury...	0,02-0,1 mg/l		1.19	solvents [5]	0,02-0,10 mg Cl/l	< 10 µg Cl/l
1.10	zinc.....	2-10 mg/l		1.20	pesticides ^[5]	1-5 µg Cl/l	< 0,5 µg Cl/l
				1.21	lipoph.sub.	0,4-2,0 mg/l	< 1 mg/l

- 1 And no single value above the minimum fixed for hazardous waste.
- 2 Readily released
- 3 If possible < 500 mg/l.
- 4 Adsorbed organically-bound halogens.
- 5 Chlorinated.

Notes : (1) For characterization purposes the components to be analysed in the eluates shall be chosen in function of the qualitative composition of the waste. (2) In addition to these eluate criteria, a determination of asbestos on a representative sample of the crude inert waste shall be performed, according to the annexes of the Council Directive 87/217/EEC on the prevention and reduction of environmental pollution by asbestos.

III.5 - ANALYTICAL METHODS.

The following ISO or DIN methods are proposed as reference methods. Any equivalent method after a certification procedure based on the use of a certified reference material will be accepted. In case of discrepancy of the results the proposed methods will be used as reference.

1.01	pH : ISO-DP 10 523 or DIN 38404-C5-84	1.12	fluoride : ISO-DP 10 359-1 or DIN 38406-D4-85
1.02	TOC in eluate : DIN 38409-H3-85	1.13	ammonium : ISO-7150-1983 or DIN 38406-E5-83
1.03	arsenic : ISO 6595-1982 or DIN 38405-E6-81	1.14	chloride : ISO-DIS 9297 or DIN 38405-D1-85
1.04	lead : ISO 8288-1985 or DIN 38406-E6-81	1.15	cyanide : DIN 38405-D14-88
1.05	cadmium : ISO 8288-1985 or DIN 38406-E19-80	1.16	sulphate : ISO-DIS 9280-1 or DIN 38405-D5-85
1.06	chromium ^{VI} : ISO-DIS 9174-88 or DIN 384 05-D24-87	1.17	nitrite : ISO-6777-1983 or DIN 38405-D10-81
1.07	copper : ISO 8288-1985 or DIN 38406-E 21-80	1.18	AOX : ISO-DIS 9562 or DIN 38409-H14-85
1.08	nickel : ISO 8288-1985 or DIN 38406-E21-80	1.19	chlorinated solvents ^[1] : ISO-DP 10 301 or GC head-space
1.09	mercury : ISO-5666-1/3-88 or DIN 38406-E12-80	1.20	chlorinated pesticides ^[2] : G.C. [capillary column]
1.10	zinc : ISO 8288-1985 or DIN 3840-E8-85	1.21	extractible lip. substances ^[3] : cf. param. 27, EEC directive. 80/778
1.11	phenols : ISO 6439-1990 or DIN 38409-H16-84		

¹ Needs 2 ml of eluate.

² After extraction of 1 liter of eluate.

³ Needs 250 ml of eluate ; chloroform extract, results in "dry residue" mg/l.

III.6 - CONTROL PROCEDURES : COMPATIBILITY CRITERIA.

Joint disposal of waste normally utilises properties available in municipal waste to attenuate those constituents in difficult wastes which are polluting and potentially hazardous and thereby make their impact on the environment acceptable. Wastes destined for joint-disposal must be critically assessed and only those wastes which are compatible with municipal waste should be accepted for joint-disposal. The maintenance of a balanced input of wastes to ensure that the attenuation processes are not overwhelmed is essential : controlling the rate of input of hazardous wastes is therefore always necessary.

6.1 - General criteria - Prerequisite conditions.

Sites which would pose a direct threat to a sensitive aquifer in the event of containment failure shall not be used for joint-disposal. The acceptability of joint-disposal in any given location shall be determined by the competent authority, in accordance with the requirements of Annex 1 of this Directive.

6.2 - Leachate monitoring - Prerequisite conditions.

- Sufficient historic data must be available to provide a clear definition of leachate levels and quality within the refuse mass.

• Specific measures for joint-disposal shall be set by the competent authority subject to the control requirements fixed in Annex IV and to the compatibility criteria fixed hereunder. The number of monitoring points in landfills where joint-disposal is practised shall be the following in function of the surface area of the operating zone :

- < 5 ha = minimum 5 ;
- 5-10 ha = one per hectare ;
- > 10 ha = 10 + [area, ha]^{1/2}.

• Joint-disposal shall not be undertaken unless monitoring shows clearly that stable methanogenic conditions are established and that a sufficient high level of activity continues. This will be determined by reference to leachate quality and gas production rate, and the following minimum conditions shall be maintained :

- average leachate temperature : $\geq 25^{\circ}\text{C}$;
- average leachate pH : > 6.8 ;
- average leachate BOD/COD ratio : ≤ 0.3 ;
- gas production rate : $> 5 \text{ m}^3/\text{t.a.}$

• There shall be a system for collection and removal from site of any surplus leachate. This shall be sized on the basis of agreed water balance calculations, taking into account both infiltrating rainfall and the liquid content of the landfilled wastes.

6.3 - Suitable and unsuitable wastes.

6.3.1 - The following wastes shall not be jointly-disposed :

<ul style="list-style-type: none">• wastes mentioned in article 9 of the Directive.• acid tars ;• immiscible organic solvents or aqueous waste containing $> 1\%$ immiscible organics ;• water miscible organic solvents with concentrations $> 10\%$.• wastes which react violently with water or organic matter.• asbestos [1].• wastes containing significant concentrations [2] of following compounds :	<ul style="list-style-type: none">- PCBs & PCTs (polychlorinated bi-and terphenyls) > 50 ppb [3]- TCDDs (tetrachlorodibenzodioxin) > 10 ppb for isomer 2,3,7,8- PCNs (polychlorinated naphthalenes) > 50 ppm total [4]- PAH (polyaromatic hydrocarbons) > 20 ppm- organometallic compounds (totally excluded)- chlorinated hydrocarbons (including chlorophenols) > 1 ppm- pesticides > 2 ppm- free cyanides > 10 ppm.
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1 Excluded because of the risks posed by excavation during joint-disposal

2 The "significant concentration" figures are extracted from EEC directives for PCBs and PCTs ; from WHO proposals for TCDDs and organometallic compounds ; from the Dutch legislation (Bodemverontreiniging - Toetsingswaarden voor de beoordeling van de concentratieniveaus van diverse verontreinigingen) for PCNs, PAHs, chlorinated hydrocarbons, pesticides and free cyanides. This values should be revised by a special Committee.

3 Part per billion, or $\mu\text{g}/\text{kg}$ on dry extract, etc.

4 Part per million, or mg/kg on dry extract, etc.

6.3.2.- The following wastes [1] may be jointly-disposed, subject to individual assessment and loading rate restrictions on specific components :

<ul style="list-style-type: none">• industrial effluent treatment sludges ;• biological treatment sludges ;• acid sludges ;• interceptor wastes and tank sludges ;• paint wastes and spray booth effluents ;• alkaline degreasants ;• detergents, fats and greases in water ;	<ul style="list-style-type: none">• adhesive wastes ;• tannery and fellmongering wastes ;• brewery wastes ;• animal and food industry wastes ;• metal finishing wastes ;• acids/alkalis ;• cutting oils/cooling oils.
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¹ The list is not exhaustive, but based on types of wastes which have been successfully jointly-disposed in several landfills (aqueous solutions excluded !).

6.4 - Loading rates.

• For hazardous wastes to be jointly disposed with municipal waste, their rate of deposition will be limited by the attenuation capacity of the accepting bulk of municipal waste. Although general guidelines can be given, the loading inevitably will be site specific. Effective monitoring of the conditions in the landfill provide the best guidance for setting appropriate loading rates.

• Loading rates are normally quoted as a quantity of hazardous waste which may be deposited either in a given period (eg. as g per m³ of municipal waste per day), or related with a given quantity of the accepting bulk (eg. as g per m³ of municipal waste) for a once-only base filling. This is the loading or rate which could be degraded or attenuated by a unit volume of methanogenic refuse. The landfill loading potential should then be applied to the reaction zone volume [1] to derive a total loading limit for the site.

• The loading rate controls shall apply to wastes containing : acids, heavy metals, cyanides, soluble organic carbon, phenols and other prescribed organic compounds. Ammonia and chloride inputs shall also be assessed, on the basis that all of the applied loading will appear in the leachate. Applied loadings must not lead to the capacity of leachate treatment and disposal systems being exceeded.

¹ The reaction zone volume is that portion of leachate-saturated refuse with which the jointly-disposed waste will come into contact either directly or during leachate recirculation. The reaction zone must provide an average retention time of at least 6 months for applied liquid wastes and for leachate from jointly-disposed solid hazardous waste.

• Default values (as mentioned in the criteria values given hereunder) are to be applied for the calculation of the maximum landfill loading potential, unless site/waste-specific data submitted by the operator justify higher loadings.

CRITERIA FOR CALCULATING LANDFILL POTENTIALS.

Waste component	Default value
• acids [1].....	100 equiv./tonne of municipal waste
• heavy metals [2, 3].....	100 g/tonne of municipal waste
Zn.....	100 g/tonne of municipal waste
Cu.....	100 g/tonne of municipal waste
Ni.....	100 g/tonne of municipal waste
Cr.....	100 g/tonne of municipal waste
Pb.....	100 g/tonne of municipal waste
Cd.....	10 g/tonne of municipal waste
Hg.....	2 g/tonne of municipal waste
As, Se.....	1 g/tonne of municipal waste
• cyanide (as CN).....	1 g/m ³ of municipal waste, per day [5]
• phenol.....	5 g/m ³ of municipal waste, per day [6]
• oil/hydrocarbons.....	2.5 kg/tonne of municipal waste
• TOC.....	10 g/m ³ of municipal waste, per day [7]
• specified organics [4]	10 g/m ³ of municipal waste, per day.

¹ Loadings to be calculated on a once-only basis, unless site monitoring in reaction zone demonstrates regeneration of buffer capacity. Acids shall be deposited in a separate area from wastes containing cyanide or sulphide.

² Loadings to be calculated on a once-only basis. A prior precipitation test shall be applied to any waste containing >100 mg/l soluble heavy metals. This should consist of a pH adjustment to 10.5, mixing for 5 minutes, followed by settlement for 30 minutes. If the soluble metal content then exceeds 20 mg/l the waste shall not be jointly-disposed, unless the operator can provide practical evidence to show its attenuation in refuse.

³ The maximum default value for the total of heavy metals shall not surpass the 100 g/tonne of municipal waste.

⁴ Organic compounds of List 1 from the Directive 80/68/EEC on groundwater.

⁵ Unless site/waste-specific data on particular wastes show them to be completely degraded. No waste containing >100 mg/l as soluble CN shall be jointly-disposed.

⁶ Unless site monitoring shows the reaction zone ability to degrade completely the phenols.

⁷ Unless specific data on particular wastes show them to be highly degradable.

6.5 - Monitoring adherence to loading controls.

• For acids, heavy metals, TOC, oil, phenols, cyanide, ammonia and chloride, control shall be based on retrospective analysis of composite samples from all inputs. The frequency of such analysis shall be related to the hydraulic retention time (HRT) in the reaction zone, as follows :

HRT >12 months, analyse monthly ;
HRT <12 months, analyse 2-weekly.

• The leachate monitoring regime shall be prescribed in the site permit to be sufficiently detailed as to detect any effects which would indicate overloading of the reaction zone. This would include both detection of residual waste components and interference with the established methanogenic processes.

6.6 - Hazardous solid wastes.

A composite sample between 1 and 2.5 kg shall be prepared by mixing 1 kg subsamples from each load of hazardous solid waste. The composite shall then be subjected to a leaching test as described in III.4. The eluate shall then be analysed for all parameters listed in the table of § 6.4 (including specified organics). Loadings to the site shall then be assessed on the basis of the mass of readily soluble components. The frequency of analysis shall be related to the hydraulic retention time as given in § 6.5.

III.7 - INTERCALIBRATION.

The qualified laboratories as designated in Article 12.4 of this Directive shall participate periodically in intercalibration exercises in order to update and improve the accuracy and precision of the control procedures and analytical methods.

ANNEX IV- CONTROL PROCEDURES IN OPERATION AND AFTER-CARE PHASES.

MEASURING PROGRAMME.

This minimum programme shall be carried out during the operational phase as an aid in the general management of the landfill, and during the after-care phase for a minimum of 30 years after the definitive closure to prevent further damage to the landfill body or to the environment and to ensure that the site remains safe. The data obtained during long periods of time and for different sites will contribute to increase the knowledge on waste behaviour in landfills.

IV 1 - METEOROLOGICAL DATA.

In situ, or from the nearest station providing data representative of the site [1].

		Operating phase	After-care phase
1.1	Volume and intensity of precipitation.....	daily	[monthly on the same day of the month
1.2	Temperature (min., max., 14.00 h CET).....	daily	
1.3	Direction and force of prevalent wind.....	daily	
1.4	Evaporation (lysimeter) [2].....	daily	
1.5	Atmospheric humidity (14.00 h CET).....	daily	

¹ Parameters 1.1 to 1.5 can be replaced by the "effective rainfall". provided by some local network.

² Or by measuring parameter 1.5 and calculation of evaporation according to HAUDE.

IV.2 - EMISSION DATA : WATER, LEACHATE AND GAS CONTROL.

Sampling. For leachate and runoff water, a 10 liter global sample, representative of the average composition, should be available each month for monitoring. Reference : General guidelines on sampling technology, ISO 5667-2-1988.

		Operating phase	After-care phase
2.1	Leachate volume.....	daily sum value	every 6 months
2.2	Leachate composition [1].....	monthly [2]	every 6 months
2.3	Surface runoff water composition.....	monthly [2]	every 6 months
2.4	Gas emissions (CH ₄ , CO ₂ , O ₂ , H ₂ S, H ₂ , etc.)...	monthly [2,3]	idem[4]

¹ The parameters to be measured and the substances to be analysed vary according to the composition of the waste deposited ; they must be laid down in the permit document and correlated to the eluate criteria of the landfilled wastes. Those chosen for the leachate should be such that estimates of the influence of the leachate on the barrier at the base of the landfill can be made from the annual evaluations.

² The measures and analysis shall be carried out at least once a month during the first year of operation. If the evaluation of data indicates that longer intervals are equally effective, they may be increased to a maximum of three months. Conductivity must always be measured at least once a month.

³ CH₄, CO₂, O₂ regularly ; other gases as required, according to the composition of the waste deposited.

⁴ Efficiency of the gas drainage layer must be checked regularly.

IV.3 - PROTECTION OF GROUNDWATER.

A.- Sampling.

The number and location of the groundwater measuring points shall be laid down in the permit document ; at least one measuring point shall be set up in the groundwater inflow region (0 level) and two in the outflow region. Reference value before starting in operation : "A complete analysis, to be used as initial reference value, should be carried out at least at three locations". Reference : Sampling Groundwaters, Project for an international norm , draft. ISO/TC 147 SC6, 1988.

B.- Monitoring.

- The substances to be analysed shall be laid down on the basis of the leachate composition determined in the operating phase. Special surveillance shall be made on the concentrations of the substances taken into account in the annex (lists 1 and 2) of the Council Directive 80/68/ EEC on the protection of groundwater against pollution caused by certain dangerous substances.

- For the substances of list 2 of Council Directive 80/68/EEC, and for groundwaters in use or usable as sources of drinkwater, the MAC values shall be those given in the Council Directive 80/778/EEC on water for human consumption and the analytical methods, those proposed in the annexes of the Directive.

	Operating phase	After-care phase
Levels of groundwater.....	every 6 months ¹	every 6 months
Groundwater composition.....	every 6 months	every 6 months

¹if there are weaving groundwater levels the intervalls shall be decreased.

For continuous monitoring, tracer parameters or components can be used, decided in function of the original characteristics of the groundwater (0 level) and of the composition of the leachate.

IV.4 - WATER BALANCE

Although the calculation of the water balance only has a theoretical value, it can be often a very convenient parameter for practical management purposes, during the operating phase.

Frequency : twice a year (april-october).

The measurement of parameters 1.1 to 1.5 (meteorological data), combined with the measurement of parameter 2.1 (leachate volume, in emission data), permits the estimation of the annual water balance in the landfill.

A convenient calculation method for a landfill in operation phase could be :

$$L_0 = I - E - aW$$

with, —

L_0 = free leachate retained at the site (equivalent to leachate production minus leachate leaving the site), in m³/annum ;

I = total liquid input (precipitation plus liquid waste, plus any surface water inflow), in m³/annum ;

E = evapotranspirative losses (evaporation plus minimal transpiration), in m³/annum ;

a = absorptive capacity^[1] of the waste, in m³/tonne of waste received ;

W = weight of waste deposited, in tonnes/annum.

The effectiveness of the attenuating mechanisms in reducing pollution risks to an acceptable level both within the landfill and in the underlying strata, implies theoretically that the site is operated so that L₀ is negative or zero. An increasing positive value for L₀ implies leachate build-up in the site.

¹ Absorptive capacity : The maximum amount of liquid taken up and retained by unit weight of solid under specified conditions ; usually the amount of liquid retained by unit weight of refuse in a landfill before leachate is emitted (or practically the residual humidity at the time of sampling).

IV.5 - TOPOGRAPHY OF THE SITE : DATA ON THE LANDFILL BODY.

		Operating phase	After-care phase
5.1	Structure and composition of landfill body [1].....	yearly	
5.2	Settling behaviour of the level of the landfill body	yearly	yearly reading

¹ Data for the status plan of the concerned landfill : surface occupied by waste, volume and composition of waste, methods of depositing, time and duration of depositing, proof of stability of the body of the landfill, calculation of the depositing capacity still available at the landfill.

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