MINISTRY OF ENVIRONMENTAL PROTECTION, PHYSICAL PLANNING AND CONSTRUCTION

3418

Pursuant to Article 104 paragraph 1 item 5 of the Waste Act (Official Gazette 178/04, 111/06) the Minister of Environmental Protection, Physical Planning and Construction hereby issues the

ORDINANCE

ON THE METHODS AND CONDITIONS FOR THE LANDFILL OF WASTE, CATEGORIES AND OPERATIONAL REQUIREMENTS FOR WASTE LANDFILLS

I GENERAL PROVISIONS

Article 1

(1) This Ordinance prescribes the categories of waste landfills, procedures and other conditions for landfilling waste, limit values for emissions into the environment during the landfill of waste, requirements and measures related to planning, construction, operation and closure of landfills and procedures after their closure.
(2) The goals of this Ordinance are to reduce, during the whole life-cycle of the landfill, the negative effects on the environment, in particular the pollution of surface water, groundwater, soil and air, including greenhouse effects, as well as reducing any risk to human health resulting from landfilling of waste and the life-cycle of the landfill.
(3) This Ordinance prescribes the procedures and other requirements for the acceptance of waste in underground storage.

Article 2

The terms used in this Ordinance shall have the following meaning:
1. *»biodegradable waste«* is any waste or part of waste that is capable of undergoing anaerobic or aerobic decomposition;
2. *»risk assessment study«* is a preliminary risk assessment for underground waste storage sites, developed for the purpose of determining the effect of landfilled waste on the entire biosphere;
3. *»eluate«* means the product and/or result obtained from a laboratory leaching test;
4. *»settlement«* means a settlement with no more than 500 inhabitants per municipality or per the settlement itself, with no more than five inhabitants per square kilometre and where the distance to the nearest urban agglomeration with at least 250 inhabitants per square kilometre is not less than 50 km or with difficult access by road to those nearest agglomerations, due to harsh meteorological conditions during a significant part of the year;
5. *»landfill«* means a facility for the deposit of waste onto or into land (underground storage)

including:
– an internal landfill where a producer of waste carries out its own waste landfilling at the place of production,
– a permanent landfill, or a part thereof, which may be used for temporary storage of waste (i.e. for a period of more than one year),
– exhausted opencast sites or parts thereof created by mining exploitation and/or exploration which are suitable for landfilling waste.
Landfills do not include:
– facilities or storage facilities where waste is unloaded in order to permit its preparation for further transport for recovery and/or disposal elsewhere,
– storage of waste prior to recovery and/or disposal for a period less than three years, or
– storage of waste prior to final deposit for a period less than one year;
6. *»landfill gas«* means all the gases generated by the landfilled waste;
7. *»operator«* means the legal or natural person (hereinafter referred to as: person) managing the landfill, authorised for its management and responsible for its operation;
8. *»underground storage«* means a permanent waste storage facility in a suitable geological cavity and/or borehole created by mining exploitation and/or exploration;
9. *»leachate«* means any liquid percolating through the deposited waste and emitted from or contained within a landfill;
10. *»liquid waste«* means any waste in liquid form including waste waters but excluding sludge.

Article 3

(1) This Ordinance shall apply to all landfills, regardless of the type of waste deposited thereon.
(2) The provisions of this Ordinance shall not apply to the following cases of landfilling:
– the spreading of sludges, including sewage sludges, and sludges resulting from dredging operations, and similar matter on the soil for the purposes of fertilisation in accordance with a special regulation on the input of dangerous substances and plant nutrients into or onto the soil
– the use of inert waste which is suitable for redevelopment/restoration and filling-in work, or for construction purposes, in landfills, in accordance with a special regulation on the burdening of soil with waste materials
– the deposit of non-hazardous and inert materials resulting from excavation of soil during construction works, if performed in accordance with a special regulation on the burdening of soil with waste materials
– the deposit of dredging sludges alongside waterways, if they have been dredged out from their water body and if they have the properties of waste which, pursuant to the requirements of this Ordinance, may be deposited on landfills for non-hazardous waste, whereby solely inorganic parameters of pollution and eluate are respected
– the deposit of unpolluted soil or of non-hazardous inert waste resulting from prospecting and extraction, treatment, and storage of mineral resources as well as from the operation of quarries in accordance with a special regulation on mining activities.

II LANDFILL CATEGORIES

Article 4

(1) Each landfill shall be classified in one of the following categories:
– landfill for hazardous waste,
– landfill for non-hazardous waste,
– landfill for inert waste.
(2) Waste depositing shall be permitted only on landfills referred to in paragraph 1 of this Article which fulfil the requirements set out in this Ordinance.
(3) The general requirements which must be fulfilled by landfills referred to in paragraph 1 of this Article are set out in Annex 1 of this Ordinance.

III WASTE NOT ACCEPTABLE IN LANDFILLS

Article 5

(1) The following wastes shall not be accepted in landfills:
– liquid waste,
– waste which is, under the landfill conditions, explosive, corrosive, oxidising, highly flammable or flammable in accordance with the provisions of special regulations,
– municipal waste if the amount of its biodegradable component exceeds 35% of the total amount (by weight),
– hospital and other clinical wastes arising from medical and/or veterinary establishments, which have the properties of hazardous, infectious and potentially infectious waste, in accordance with special regulations,
– waste tyres,
– animal and slaughter house waste, animal carcasses and animal products, if not thermally treated in accordance with special regulations,
– waste industrial and automotive batteries and accumulators,
– end-of-life motor vehicles and their untreated component parts which are generated in the process of treatment and recovery of end-of-life vehicles,
– waste electrical and electronic equipment and devices,
– all other types of waste which do not meet the criteria for acceptance of waste at landfills pursuant to Annex 3 of this Ordinance.
(2) The depositing of inert, hazardous and non-hazardous waste shall be permitted in underground storage, except for special types of waste which might during landfilling undergo physical, chemical or biological transformation which could endanger the landfill body or present an additional environmental hazard, such as:
– waste in or without containers which in the underground storage conditions might react with water or with the host rocks,
– waste which might react with each other, unless it is sorted into groups according to compatibility when stored in the underground storage and incompatible groups are physically separated from each other,
– biodegradable waste,
– waste with pungent smell,
– waste that can generate toxic gases or a gas-air mixture which is explosive,
– waste which is unstable in the geomechanical conditions of underground storage,
– auto-flammable waste or waste that is liable to spontaneous combustion under the underground storage conditions,
– gases and volatile liquids with vapour pressure that is liable to combustion under the underground storage conditions,
– waste of unknown composition.
(3) Waste may be accepted in underground storage if the Risk assessment study referred to

Annex 1 of this Ordinance demonstrates that the level of isolation and impact of the underground storage location is acceptable to the biosphere.

IV WASTE ACCEPTABLE IN LANDFILLS

Article 6

(1) Only pre-treated waste shall be landfilled.
(2) Depositing without prior treatment may only be permitted for inert waste for which treatment is not technically feasible and for any other non-hazardous waste for which such treatment does not contribute to reducing the quantity of the waste or the properties of waste which cause adverse effects to the environment or human health or does not contribute to the fulfilment of the goals referred to in Article 1 of this Ordinance.
(3) The approval for landfilling waste referred to in the previous paragraph shall be established by the competent body as part of the landfill permit.
(4) The criteria which waste must fulfil in order to be deposited in various landfill categories are set out in Annex 3 of this Ordinance.
(5) Inert waste landfill sites shall be used only for inert waste.
(6) Depositing of the following waste shall be permitted in landfills for non-hazardous waste:
– municipal waste according to the acceptance criteria in Annex 3 of this Ordinance,
– non-hazardous waste of any other origin which fulfils the criteria for the acceptance of waste at a landfill for non-hazardous waste pursuant to Annex 3 of this Ordinance,
– stable and non-reactive pre-treated hazardous wastes under the condition that the limit values of pollution in waste and eluate do not exceed the limit values for acceptance of non-hazardous waste in the landfills referred to in Annex 3 of this Ordinance.
(7) By way of derogation from the provision of Article 5 paragraph 1 indent 3 of this Ordinance, it shall be permitted to deposit municipal waste with a high content of biodegradable substances in a separate landfill cell for which special procedures are used solely for the purpose of producing energy from the landfilled waste.
(8) Only the depositing of hazardous waste which meets the criteria for acceptance of hazardous waste on landfills prescribed in Annex 3 of this Ordinance shall be permitted on landfills for hazardous waste.
(9) Mixture of waste with other substances or other waste in order to reduce the content of hazardous substances in waste and meet the waste acceptance criteria shall be prohibited.
(10) By way of derogation, in emergency cases it may be permitted to landfill waste with pollution parameters up to three times higher than the limit values referred to in Annex 3, except for the following pollution parameters:
– dissolved organic carbon – DOC, BTEX, PCB and mineral oils in the case of inert waste,
– dissolved organic carbon – DOC and pH, in the case of stable and non-reactive waste which may be deposited on landfills for non-hazardous waste,
– loss on ignition or total organic carbon – TOC, in the case of hazardous waste, and
– total organic carbon – TOC, in the case of inert waste restricting the possible increase of the limit value for TOC to only two times the limit values referred to in Annex 3 of this Ordinance
(11) The depositing of waste referred to in paragraph 10 of this Article may be authorised only for previously determined waste quantities which are intended for landfill for a maximum period of 12 months, subject to the development of a preliminary study which shows that the exceedance of limit values referred to in Annex 3 of this Ordinance will not have an adverse effect on the environment.

V PRELIMINARY WASTE ACCEPTANCE PROCEDURES

Article 7

(1) Waste depositing on landfills including underground storage shall be permitted subject to prior preparation of basic characterisation of the waste intended for landfill.
(2) The procedure for the preparation of basic waste characterisation is set out in detail in Annex 2 of this Ordinance.
(3) The preparation of the basic waste characterisation shall be ensured by the waste producer and/or holder who is delivering the waste to the landfill.
(4) The basic waste characterisation may be prepared by a person who has obtained the approval of the competent body pursuant to a special regulation on the performance of professional environmental protection activities.
(5) The person referred to in paragraph 4 of this Article must be accredited by the national accreditation service for waste analysis for at least one of the organic and one of the inorganic pollution parameters established in the waste acceptance criteria referred to in Annex 3 of this Ordinance.
(6) For analysis of waste properties standard procedures and methods shall be used in conformity with the standards in effect in the Republic of Croatia.
(7) Waste sampling methods are set out in Annex 5 of this Ordinance.
(8) In the procedures for analysing waste properties other analysis methods may also be used, if the results of those methods are equivalent to the results of the procedures and methods referred to in paragraph 6 of this Article.

Article 8

(1) In the event that the basic waste characterisation shows that the waste may be accepted in a certain type of landfill, the waste must be submitted to compliance testing in order to determine whether the waste in question corresponds to the values stated in the basic characterisation and whether it meets the waste acceptance criteria referred to in Annex 3 of this Ordinance.
(2) The compliance testing parameters and the compliance testing procedure must be stated in the basic waste characterisation and the landfill operator must take care that the compliance testing is carried out according to the scope and procedure set out in the basic waste characterisation.
(3) The aim of compliance testing is periodic checking of waste which is regularly delivered for landfilling.
(4) Waste compliance testing is carried out according to the sampling and testing methods for the preparation of the basic waste characterisation referred to in Article 7 of this Ordinance.
(5) The results obtained by compliance testing must be kept by the operator for at least 3 years.

Article 9

(1) The basic waste characterisation shall not be developed for:
1. waste held by the same holder, if the total quantity of deposited waste in a period of four successive months does not exceed 200 kg and if, on the basis of available waste data and visual inspection of the waste, it is established that the waste is not contaminated by hazardous substances
2. waste held by the same holder:

– if the total quantity of waste deposited in one year does not exceed 15 tonnes
– if prior to waste delivery the holder provides a written statement confirming that the stated amount in the permitted period will not be exceeded, that the waste is not contaminated by hazardous substances and that the share of biodegradable components is less than 5% of dry substance content, whereby the type, source and origin of each waste shipment must be precisely identified
3. municipal waste classified under key numbers 200202 and 200303 from the Regulation on categories, types and classification of waste with a Waste Catalogue and List of Hazardous Waste (Official Gazette 50/2005).
(2) The waste holder referred to in paragraph 1 of this Article delivering waste to the landfill must, along with the prescribed accompanying form, also submit a statement confirming that the waste is not contaminated by hazardous substances and that it does not have hazardous properties.
(3) The operator must establish that the weight of the waste referred to in paragraph 1 items 1 and 2 of this Article does not exceed 0,5% of the total amount (by weight) of waste deposited on the landfill.

Article 10

(1) Prior to depositing waste on the landfill, the operator must ensure that all waste documentation is checked.
(2) The checking of waste documentation includes verification of its completeness and correctness pursuant to the requirements prescribed by this Ordinance, and especially checking of the waste characterisation results and the compliance testing results.
(3) The operator may only accept waste for which the check referred to in paragraph 1 and 2 of this Article has been carried out and for which a filled out accompanying form has been delivered in accordance with a special regulation.
(4) Waste accepted by the operator at the landfill must first be weighed and visually inspected before and after unloading at the landfill. Weighing may be performed using a scale at the landfill, outside the landfill or using scales on waste transport vehicles.
(5) The operator shall keep a register on the total amount, types and origin of waste in accordance with a special regulation for all waste accepted at the landfill.

Article 11

(1) If the same holder regularly delivers shipments of the same type of waste to the same landfill for a longer period of time, the waste characterisation must be developed before delivery of the first shipment, while for the subsequent shipments of the same type of waste it must be developed at least every 12 months.
(2) The holder of the same type of waste must also ensure that the waste characterisation includes data on the process and origin of waste and on input materials in the process in which the waste is generated and especially on the changes it has undergone.

Article 12

(1) The operator shall refuse to accept waste at the landfill if:
– the depositing of such waste at the landfill is not permitted and especially if the results of the waste characterisation show that landfilling is not permitted,
– the basic waste characterisation has not been developed,
– interaction with waste already deposited on the landfill significantly increases the

probability of environmental burdening,
– the waste characterisation contents are incomplete, insufficient or the results are unclear,
– the prescribed validity of the waste characterisation has expired,
– the operator has doubts about the waste being of the same type or about the amount of hazardous substances that it contains,
– geotechnical properties of the waste and the conditions of its depositing in the landfill body do not guarantee the necessary stability of the landfill body.
(2) In the event that the operator refuses to accept the delivered waste, pursuant to paragraph 1 of this Article, he may allow the holder to temporarily store the waste at the landfill site for a maximum of four months, during which time the holder must supplement the basic waste characterisation or develop it anew.
(3) The first day of waste storage referred to in paragraph 2 of this Article must be recorded in the landfill log.
(4) In the event that the operator establishes that the delivered waste does not correspond to the data in the accompanying waste characterisation or if he refuses to accept the waste shipment in the cases referred to in paragraph 1 of this Article, he shall notify in writing the inspector competent for environmental protection.
(5) The report referred to in paragraph 4 of this Article, apart from the data on the waste holder, must also contain data on the person who developed the basic waste characterisation.

Article 13

(1) During regular waste depositing in the landfill body it must be ensured that:
1. the method used for depositing waste in the landfill body ensures the safety of landfill staff and does not endanger the landfill bottom sealing system, the stability of the landfill body or other technical facilities of the landfill,
2. best available techniques for depositing waste in the landfill body, covering the landfilled waste and other preventive measures are used to prevent dispersal of fluff-light fractions of waste by wind and to reduce dust and odour emissions into the air and the gathering of vermin, birds or rodents.

Article 14

At the request of an operator who is at the same time the only holder depositing waste at a specific landfill, a simplified form of the waste acceptance procedure referred to in Article 10 of this Ordinance may be approved, consisting of the following:
– verification and completion of the filled out accompanying form by the waste holder,
– visual inspection of the waste before landfilling, and weighing of the waste during loading and unloading at the landfill,
– verification of the entire waste documentation before landfilling.

VI LANDFILL PERMIT

Article 15

The activity of waste landfilling may be performed by an operator only if he has obtained a permit pursuant to the Waste Act and the requirements set out under this Ordinance.

Article 16

The application for a landfill permit must be accompanied by the following:
– identity (name and surname, address, ID number) of the applicant,
– description of the waste type and quantities to be deposited on the landfill and the total landfill capacity,
– a waste management plan for the landfill, measures for preventing and reducing environmental pollution, monitoring and supervising landfill operation,
– landfill closure plan and after-care measures for preventing adverse environmental impacts after closure,
– necessary data on environmental impacts from the prescribed documents on environmental impact assessment, including a description of the landfill site,
– form of financial guarantee needed for ensuring the undertaking of environmental protection measures after landfill closure, secured by the applicant,
– study on risk assessment of permanent storage of waste in underground storage pursuant to Annex 1 of this Ordinance,
– documentation proving that the landfill is constructed legally in conformity with all the general conditions set out under this Ordinance.

Article 17

The landfill permit shall determine in detail:
– landfill category, pursuant to Article 4 of this Ordinance
– waste types and quantities which may be deposited on the landfill
– amount of biodegradable waste components which may be deposited in each calendar year
– waste acceptance procedure and compliance testing and other operational requirements
– control, monitoring of operations and other forms of supervision over environmental pollution referred to in Article 19 of this Ordinance, except for underground storage
– method of regular inspection of the landfill body and technical facilities of the landfill
– permitted changes to indicator groundwater parameters
– requirements connected to reporting on types, place of origin and quantities of landfilled waste
– requirements connected to landfill closure and after-care measures for preventing adverse environmental impacts after closure
– period during which the operator must ensure the performance of prescribed obligations referred to in Article 20 of this Ordinance after landfill closure
– annual quantity and area for depositing residues from the recovery of construction waste and for depositing construction waste containing firmly bound asbestos in the event that the applicant has requested landfilling.

VII COST OF THE LANDFILL OF WASTE

Article 18

Costs of the landfill of waste in accordance with the “polluter pays” principle include costs of landfill design and construction, landfill operational expenses and estimated costs of landfill closure, after-care maintenance and supervision for a period of 30 years after closure.

VIII CONTROL IN THE OPERATIONAL PHASE

Article 19

(1) The operator managing landfills for hazardous and non-hazardous waste must ensure control during the operational phase of the landfill.
(2) Control shall include:
– measuring meteorological parameters,
– measuring landfill gas emissions,
– measuring leachate and precipitation discharges from the landfill surface,
– measuring the hazardous substance pollution parameters of groundwater, if located in the landfill impact area,
– control of landfill body stability.
(3) Control shall be carried out in the scope and using the method established in Annex 4 of this Ordinance.
(4) Necessary testing and analysis shall be performed by accredited laboratories pursuant to special regulations.
(5) The operator shall notify the competent body of all adverse environmental impacts discovered during control procedures and of corrective measures undertaken at his own expense.
(6) The operator shall draw up an annual report on all control results.

IX LANDFILL CLOSURE, AFTER-CARE MAINTENANCE AND SUPERVISION AFTER LANDFILL CLOSURE

Article 20

(1) The landfill or part of the landfill may be closed and/or may cease operations once the requirements for closure prescribed in the permit referred to in Article 15 of this Ordinance have been fulfilled and the competent body has granted its approval.
(2) The landfill or part of the landfill shall be considered closed when the competent body establishes after inspection that all requirements and conditions pertaining to closure prescribed in the permit have been fulfilled and issues the Decision on landfill closure.
(3) After landfill closure the operator is responsible for after-care maintenance of the landfill, implementation of prescribed measures for preventing adverse environmental impacts and control after closure, set out in the permit referred to in Article 15 of this Ordinance.
(5) In the Decision on landfill closure the competent body may, if it assesses that the measures prescribed in the permit are insufficient, prescribe additional measures for preventing adverse environmental impacts as well as additional control measures.
(6) In the event of observed unforeseen adverse environmental impacts, the operator of the closed landfill shall notify the competent body so that corrective measures may be undertaken in time.
(7) The operator of a closed landfill shall, within the deadline set out in the permit referred to in Article 15 of this Article or in the Decision on landfill closure, ensure:
– maintenance and protection of the closed landfill
– regular checks of the landfill body status
– performance of landfill control and supervision
– development of the annual report on landfill status and implementation of prescribed measures.

X TRANSITIONAL AND FINAL PROVISIONS

Article 21

(1) For existing landfills which meet the requirements established under this Ordinance, the operator shall submit to the competent body an application for a landfill permit, in accordance with the requirements set out under this Ordinance, within one year from the day of entry into force of this Ordinance.
(2) For existing landfills which do not meet the requirements established by this Ordinance, the operator shall, within one year from the entry into force of this Ordinance, develop a landfill restoration plan and/or landfill closure plan pursuant to the requirements set out under this Ordinance and submit it to the competent body for approval.
(3) Based on approved landfill restoration plans and/or landfill closure plans and the requirements set out under this Ordinance, existing landfills referred to in paragraph 2 of this Article must be remediated and/or closed by 31 December 2011 at the latest.

Article 22

(1) The provisions of Article 5 paragraph 5 indent 3 of this Ordinance shall apply to all landfills as of 31 December 2016.
(2) The provision of Article 6 paragraph 1 of this Ordinance shall not apply to existing landfills which pursuant to approved landfill remediation plans and/or landfill closure plans are used for landfilling waste until the start of operation of waste management centres.
(3) The provision of Article 5 paragraph 1 indent 3 and Article 6 paragraph 1 of this Ordinance shall apply to all landfills within waste management centres which began operating after the entry into force of this Ordinance.
(4) The provision of Article 5 paragraph 1 indent 3 of this Ordinance shall not apply to existing landfills which pursuant to approved landfill remediation plans and/or landfill closure plans are used for landfilling waste until the start of operation of waste management centres.
(5) With the aim of fulfilling the requirements referred to in Article 5 paragraph 1 indent 3 of this Ordinance, data for the gradual reduction of biodegradable content in the total amount of municipal waste which may be deposited on landfills for non-hazardous waste as of the day of entry into force of this Ordinance, are established in the Waste Management Plan of the Republic of Croatia.

Article 23

Annexes 1, 2, 3, 4, 5 with their corresponding content are published along with this Ordinance and represent a constituent part thereof.

Article 24

This Ordinance shall enter into force on the eighth day after the day of publication in the Official Gazette.

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Zagreb, 8 November 2007

Minister
Marina Matulović Dropulić, m.p.

ANNEX 1

GENERAL REQUIREMENTS FOR ALL LANDFILL CATEGORIES

1. Location of the landfill

1.1. The location of the landfill must be situated at a distance of at least 500 m from a permanently inhabited settlement

1.2. A landfill cannot be located in:

– a protected water district, established pursuant to regulations governing water protection,

– a protected area of thermal and mineral water sources, established pursuant to regulations governing water protection,

– floodplains, established pursuant to regulations governing water protection,

– an area endangered by landslides, caving, subsidence or other land mass movement, if those dangers cannot be prevented by applying technical measures,

– areas with unequal geotechnical properties on the surface and bellow it, which endanger the landfill, if those dangers cannot be prevented by applying technical measures,

– terrain outside the floodplain referred to in indent 3, if the turn-around time in the floodplain is 500 years and if insurance against flood water cannot be secured by applying technical measures,

– terrain with free-flowing ground water, if the level of the highest expected groundwater surface, when taking into account possible subsidence, is less than one meter under the landfill base and this distance cannot be established by appropriate technical measures.

2. Water protection

2.1 The landfill bottom must be situated at least 1 m above the highest groundwater level.

2.2 The landfill base, at least in the area of the landfill body, must be geologically and hydrogeologically uniform and of such geological structure so as to ensure protection of the soil and protection against surface and groundwater pollution.

2.3 Average impermeability of the soil in the area of the landfill base and sides of the landfill body must be lower than:

- landfill for hazardous waste: $K = 1 \times 10^{-9}$ m/s; soil thickness ≥ 5 m,
- landfill for non-hazardous waste: $K = 1 \times 10^{-9}$ m/s; soil thickness ≥ 1 m,
- landfill for inert waste: $K = 1 \times 10^{-7}$ m/s; soil thickness ≥ 1 m,

Fulfilment of these requirements may be ensured by adding artificial geological barriers on the landfill base and sides of the landfill body in order to achieve equivalent soil properties in terms of permeability and water retention.

An artificially established geological barrier must not be less than 0,5 m thick.

2.4 For the landfill body it is necessary to design the landfill base and sides in such a way that they ensure the stability of the landfill and the construction of sealing and drainage layers.

2.5 The landfill base and sides must be covered with a sealing layer.

2.6 On landfills for hazardous and non-hazardous waste leachate drainage through the drainage layer and its collection outside the landfill body must be ensured.

2.7 The drainage layer must be thicker than 0,5 m.

2.8 Collected leachate must be treated before discharge into tanks pursuant to regulations on water protection.

2.9 Penetration of waste into the drainage layer must be prevented by using acceptable technical solutions.

The requirements referred to in item 2.2 and 2.3. need not apply for landfills for inert waste if prescribed environmental impact assessment procedures show that there are no adverse impacts on the quality of soil, groundwater and surface water.

3. Landfill sealing

3.1 Surfaces of filled parts of the landfill body of landfills for non-hazardous and hazardous waste must be sealed and necessary surface sealing with a built in precipitation water drainage system and gas drainage system ensured.

3.2 Precipitation water must not come into contact with the filled landfill body and must be collected separately from leachate.

3.3. Recommendations for surface sealing are providing in the table below:

Type of landfill	Landfill for non-hazardous waste	Landfill for hazardous waste
Gas drainage layer	required	not required
Artificial sealing liner	not required	required
Impermeable mineral layer	required	required
Drainage layer > 0,5 m	required	required
Top soil cover > 1 m	required	required

4. Landfill gas

4.1 If landfill gas is generated at the landfill, it is necessary to ensure a collection system for landfill gas which must be treated and used.

4.2 If the collected landfill gases cannot be used to produce energy, they must be flared on the landfill or their emission into the air must be prevented.

5. Basic landfill equipment

–A sign must be put up at the entrance of the landfill stating the name of the operator, type of landfill and operating hours of the landfill.

–The emergency procedure plan must be visibly displayed at the landfill.

– The landfill must be surrounded by a fence at least 2 metres in height.

– The landfill shall be kept under continuous supervision so that illegal dumping in the facility is prevented.

– The landfill area must include sufficiently large surfaces where acceptance and checking of delivered waste may be carried out as well as parking and manoeuvring of delivery vehicles.

– The landfill must possess equipment for preventing transport vehicles from dispersing dust and dirt originating from the landfill onto public roads.

– The landfill area must include sufficient storage space for temporary storage of waste prior to landfilling.

– The landfill must be connected to the public road.

– The vehicle in which waste is delivered to the landfill must be equipped to prevent waste dispersal, spreading of dust, noise and odours.

– A fire buffer zone 4-6 metres in width must surround the landfill fence.

– The fire buffer zone must be surrounded by a green zone of sufficient height.

6. Contents of the Risk assessment study for underground storage

1. GEOLOGICAL ASSESSMENT

Geological assessment shall include investigation and analysis of kinds of rocks, soils and the topography. The assessment must show that the location for underground storage is suitable.

Investigation must include the location, frequency and structure of any faulting or fracturing in the surrounding geological strata and the potential impact of seismic activity on those structures.

2. GEO-MECHANICAL ASSESSMENT

Geo-mechanical assessment shall be used to prove the stability of underground spaces by using appropriate investigations and predictions. The assessment must take into account the waste planned to be deposited.

The geo-mechanical assessment must demonstrate:

1. that during and after the formation of the cavities, no major deformation is to be expected either in the cavity itself or at the earth surface which could impair the operability of the underground storage or provide a pathway to the biosphere;
2. that the load bearing capacity of the cavity is sufficient to prevent its collapse during operation.;
3. that the deposited material has the necessary stability compatible with the geo-mechanical properties of the host rock.

3. HYDROGEOLOGICAL ASSESSMENT

Hydrogeological assessment includes detailed investigation of hydraulic properties, with the aim of assessing the groundwater flow pattern in the surrounding strata based on information on hydraulic conductivity of the rock mass, fractures and the hydraulic gradients.

4. GEOCHEMICAL ASSESSMENT

Geochemical assessment includes detailed investigation of the rock and groundwater composition in order to determine the present groundwater composition and its potential evolution over time, the nature and abundance of fracture filling minerals as well as a quantitative mineralogical description of the host rock. The assessment must also evaluate the impact of variability on the geochemical system.

5. BIOSPHERE IMPACT ASSESSMENT

Biosphere impact assessment is investigation of the biosphere which may be affected by the underground storage. Baseline studies must be developed in order to define local natural background levels of adequate substances.

6. ASSESSMENT OF THE OPERATIONAL PHASE

The assessment of the operational phase must demonstrate:

1. the stability of underground spaces during the operation of the underground storage;
2. that there is no unacceptable risk of a pathway developing between the wastes and the biosphere;
3. that there are no unacceptable risks which might affect the operation of the underground storage facilities.

When demonstrating operational safety of the underground storage it is necessary, on the basis of specific data on the waste inventory, facility management and operational plan, to develop a systematic analysis of the facility operations. The assessment of the operational phase must show that the waste will not react with the rock in any chemical and/or physical way which would impair the strength and tightness of the rock and endanger the storage itself. Particular incidents which might lead to the development of a pathway between the wastes and the biosphere in the operational phase of the underground storage must be identified. Different types of possible fluctuations during operation must be classified in different hazard categories and their possible effects must be evaluated. The assessment of the operational phase must show that there are no unacceptable risks if devastation of the sealing layer occurs during operation. Contingency measures should also be foreseen.

7. LONG-TERM ASSESSMENT

In order to comply with the objectives of permanent landfilling, risk assessment must also include long-term effects. The long-term assessment must ascertain that no pathways between

pollutants and the biosphere will be generated during the long-term post-operation of the underground storage of deposited waste. A quantitative analysis of underground storage barriers in the long-term must be performed (such as: the waste quality, engineered structures, back filling and sealing of shafts and drillings), performance of the host rock, surrounding strata and overburden and they must be evaluated on the basis of site-specific data or sufficiently conservative assumptions. Account should be taken of the geochemical and geohydrological conditions such as: groundwater flow, barrier efficiency, natural attenuation and leaching of the deposited waste.
Long-term safety of underground storage of waste must be demonstrated by a safety assessment which contains a description of the initial status at a specified time (such as: time of closure) and by a scenario outlining important changes that are expected over geological time. It is also necessary to evaluate the consequences of release of relevant substances from the underground storage in different scenarios which reflect the possible long-term evolution of the biosphere, geosphere and the underground storage.
Due to the limited lifetime of containers and cavity lining of underground spaces they should not be taken into account when assessing the long-term risks of waste deposits.
8. IMPACT ASSESSMENT OF THE SURFACE RECEPTION FACILITIES
Surface reception facilities for waste intended for underground storage must be designed and operated in such a way so as to prevent damage to the local environment and to human health. Facilities must meet the same requirements as any other facility for the reception and temporary storage of waste in accordance with special regulations on waste management.
9. ASSESSMENT OF OTHER RISKS
For reasons of protection of employees, waste must be deposited only in underground storage which must be securely separated from mining activities. Waste must not be accepted if it contains or could contain hazardous substances which might endanger human health (such as: pathogenic germs of communicable diseases etc.).
On the basis of the overall risk assessment, measures for supervision and protection of waste in underground storage should be developed as well as a basis for waste acceptance in underground storage.

ANNEX 2

BASIC WASTE CHARACTERISATION

Basic waste characterisation establishes the characteristics of waste on the basis of all data necessary for its final disposal in a safe manner.
Basic waste characterisation includes:
– the key number from the waste classification list, waste type, appearance, description of waste and its characteristic properties
– place of generation and origin of waste
– information on the production process in which the waste is generated (description and properties of the raw materials and products)
– description of pre-treatment pursuant to Article 6 of the Ordinance or a statement explaining why pre-treatment is considered unnecessary
– data on waste composition and behaviour during elution (if relevant),
– landfill category where the waste may be deposited pursuant to the acceptance criteria referred to in Annex 3 of this Ordinance
– data on relevant hazardous properties for hazardous waste pursuant to a special regulation
– evidence that the waste does not fall under the exemptions referred to in Article 5 of this

Ordinance
– assessment of the expected consequences of waste landfilling in relation to its properties and, if necessary, special requirements and measures to be undertaken when landfilling
– specific key waste parameters for determining compliance testing for acceptance on the landfill and the dynamics of the procedure for determining compliance testing
– period of validity of waste characterisation
– scope of composition and scope and variability of characteristic properties of waste from the same production process
Basic development methods for waste characterisation:
1. The basic waste characterisation shall be prepared in electronic and written form
2. The basic waste characterisation shall be developed on the basis of sampling and results of waste testing.
3. Testing of waste and eluate shall include all key waste pollution parameters and eluate parameters for depositing on a specific type of landfill indicated in Annex 3 of this Ordinance.
4. Samples delivered for waste characterisation and testing must be representative.
5. In waste testing all waste pollution parameters of significance for the reactive processes on the landfill must be included.
6. If due to its place of generation or origin the pollution of waste by hazardous substances is not typical, this must be distinctively indicated in the waste characterisation.
7. When the taking of a representative sample is not possible due to the fact that the waste is not homogenous, the basic waste characterisation must be based on theoretical data and empirical values and explanations.
8. If the waste consists of waste packaging contaminated by chemicals or chemical residues or by unused chemicals for which a safety data sheet has been developed in accordance with regulations on chemicals, instead of chemical analysis results, data on the raw material composition from the safety data sheet may be used for determining waste characterisation.
9. All necessary data must be known and all necessary evidence must be provided for the development of the waste characterisation.
The characterisation must be accompanied by the following data which served as a basis for its development:
– description of waste sampling,
– anticipated quantity and dynamics of waste generation
– report on testing the hazardous properties of waste
– report on research of the effects of waste depositing on the stability of the landfill body
– explanation for not treating the waste prior to landfilling
– report on other additional research
– bibliography

ANNEX 3

BASIC CRITERIA FOR ACCEPTANCE OF WASTE AT VARIOUS CATEGORIES OF LANDFILLS

1. CRITERIA FOR ACCEPTANCE OF WASTE AT LANDFILLS FOR INERT WASTE

1.1. Limit values for waste eluate parameters

Parameter	Expressed	Unit	Limit value of eluate

	as		parameter ****L/S = 10 l/kg
Arsenic	As	mg/kg dry substance	0,5
Barium	Ba	mg/kg dry substance	20
Cadmium	Cd	mg/kg dry substance	0,04
Chrome total	Cr	mg/kg dry substance	0,5
Copper	Cu	mg/kg dry substance	2
Mercury	Hg	mg/kg dry substance	0,01
Molybdenum	Mo	mg/kg dry substance	0,5
Nickel	Ni	mg/kg dry substance	0,4
Lead	Pb	mg/kg dry substance	0,5
Antimony	Sb	mg/kg dry substance	0,06
Selenium	Se	mg/kg dry substance	0,1
Zink	Zn	mg/kg dry substance	4
Chloride	Cl	mg/kg dry substance	800
Fluoride	F	mg/kg dry substance	10
Sulphate	SO_3	mg/kg dry substance	1000*
Phenol index		mg/kg dry substance	1
Dissolved organic carbon – DOC**	C	mg/kg dry substance	500
Total dissolved solids ***	-	mg/kg dry substance	4000

*The waste complies with the requirements for inert waste if the measured value of sulphate in eluate does not exceed 6.000 mg/kg dry substance

**If the measured value of eluate parameters exceeds the limit value of eluate parameters stated in the table at its own pH value, it may be tested at a pH between 7,5 and 8,0

***The values for total dissolved solids may be used alternatively to the values for sulphate and chloride.
****L/S=liquid/solid

1.2 Additional limit values for waste pollution parameters:

Parameter	Expressed as	Unit	Limit value of pollution parameters mg/kg
Total organic carbon – TOC	C	% dry substance content	30.000*
BTEX (benzene, toluene, ethylbenzene and xylenes)	–	mg/kg dry substance	6
PCBs – polychlorinated biphenyls		mg/kg dry substance	1
Mineral oil		mg/kg dry substance	500
PAHs – polycyclic aromatic hydrocarbons		mg/kg dry substance	10

In the case of soil, the measured value of pollution parameters may exceed the limit value if DOC does not exceed the limit values for eluate parameters from the previous item.

* A higher limit value may be admitted by the competent body, 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.

1.3 The following inert waste may be accepted at landfills for inert waste without prior testing of eluate and organic pollution parameters:

Key number	Type	Restrictions
10 11 03	Waste glass-based fibrous materials	Only without organic binders
15 01 07	Glass packaging	
17 01 01	Concrete	Selected construction and demolition waste only *
17 01 02	Bricks	Selected construction and demolition waste only *

17 01 03	Tiles and ceramics	Selected construction and demolition waste only *
17 01 07	Mixtures of concrete, bricks, tiles and ceramics	Selected construction and demolition waste only *
17 02 02	Glass	
17 05 04	Soil and stones	Excluding topsoil, peat; excluding soil and stones from contaminated sites
19 12 05	Glass	
20 01 02	Glass	Separately collected glass only
20 02 02	Soil and stones	Only from garden and parks waste; Excluding top soil, peat

*Selected construction and demolition waste with low contents of other types of materials (like metals, plastic, soil, organics, wood, rubber, etc); and no construction and demolition waste 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; and no construction and demolition waste which is treated, covered or painted with materials containing dangerous substances in significant amounts.
The origin of waste must be known.
If the waste listed in the table is polluted or contains other materials or substances such as metals, asbestos, plastics, chemicals etc. to an extent which increases the risk associated with the waste sufficiently to justify its depositing in other categories of landfills, it shall not be accepted at a landfill for inert waste.

2. CRITERIA FOR ACCEPTANCE OF WASTE AT LANDFILLS FOR NON-HAZARDOUS WASTE

2.1 Limit values for waste eluate parameters for stable non-reactive hazardous waste and other non-hazardous waste:

Parameter	Expressed as	Unit	Limit value of eluate parameter ***L/S = 10 l/kg
Arsenic	As	mg/kg dry substance	2
Barium	Ba	mg/kg dry substance	100
Cadmium	Cd	mg/kg dry substance	1

Chrome total	Cr	mg/kg dry substance	10
Copper	Cu	mg/kg dry substance	50
Mercury	Hg	mg/kg dry substance	0,2
Molybdenum	Mo	mg/kg dry substance	10
Nickel	Ni	mg/kg dry substance	10
Lead	Pb	mg/kg dry substance	10
Antimony	Sb	mg/kg dry substance	0,7
Selenium	Se	mg/kg dry substance	0,5
Zink	Zn	mg/kg dry substance	50
Chloride	Cl	mg/kg dry substance	15.000
Fluoride	F	mg/kg dry substance	150
Sulphate	SO_4	mg/kg dry substance	20.000
Dissolved organic carbon – DOC*	C	mg/kg dry substance	800
Total dissolved solids **	-	mg/kg dry substance	60.000

*If the measured value of eluate parameters exceeds the limit value of eluate parameters stated in the table at its own pH value, it may be tested at a pH between 7,5 and 8,0
**The values for total dissolved solids may be used alternatively to the values for sulphate and chloride.
***L/S=liquid/solid

2.2. Additional limit values for waste pollution parameters for stable non-reactive hazardous waste:

Parameter	Expressed as	Unit	Limit value for pollution parameter
Total organic	C	% dry substance	5%*

carbon – TOC		content	
pH	-	-	at least 6

* If this value is not achieved, a higher limit value may be admitted by the competent body, provided 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.

2.3. Non-hazardous municipal and separately collected non-hazardous fractions of household wastes and the same non-hazardous materials from other origins and places of generation defined under special regulations, can be accepted at landfills for non-hazardous waste without prior testing of eluate and organic pollution parameters.
2.4. Stable non-reactive hazardous waste must not be landfilled in the same cell with treated municipal waste or collected fractions of non-hazardous municipal waste.
2.5. Non-hazardous gypsum-based materials/waste which are deposited on landfills for non-hazardous waste may be deposited only in landfill cells where no biodegradable waste is accepted.
Limit values for TOC – total organic carbon and DOC – dissolved organic carbon referred to in item 2.1.2.2 shall also apply to waste deposited together with gypsum-based materials.
2.6. Asbestos waste
Construction materials containing asbestos and waste containing firmly bound asbestos may be deposited on landfills for non-hazardous waste without prior testing of eluate and organic pollution parameters if the following requirements are met:
– the waste must not contain any other hazardous substances except firmly bound asbestos,
– only construction waste containing firmly bound asbestos and other waste containing firmly bound asbestos may be landfilled,
– waste may be landfilled only in special landfill cells, separately from the other waste at the landfill,
– the zone of deposit must be covered daily in such a way to prevent dispersion of asbestos fibres into the environment during covering,
– if the waste is not packed it must be sprinkled before landfilling,
– a final top cover must be placed on the landfill cell body containing asbestos waste in order to prevent the release of asbestos fibres into the environment,
– no works are to be carried out on the landfill cell containing asbestos waste that could lead to release of asbestos fibres into the environment,
– after closure of the landfill which has a landfill cell containing asbestos waste all future use of the landfill surface must be prevented.

3. CRITERIA FOR ACCEPTANCE OF WASTE AT LANDFILLS FOR HAZARDOUS WASTE

3.1 Limit values for waste eluate parameters:

Parameter	Expressed as	Unit	Limit value of eluate parameter ***L/S = 10 l/kg
Arsenic	As	mg/kg dry substance	25

Barium	Ba	mg/kg dry substance	300
Cadmium	Cd	mg/kg dry substance	5
Chrome total	Cr	mg/kg dry substance	70
Copper	Cu	mg/kg dry substance	100
Mercury	Hg	mg/kg dry substance	2
Molybdenum	Mo	mg/kg dry substance	30
Nickel	Ni	mg/kg dry substance	40
Lead	Pb	mg/kg dry substance	50
Antimony	Sb	mg/kg dry substance	5
Selenium	Se	mg/kg dry substance	7
Zink	Zn	mg/kg dry substance	200
Chloride	Cl	mg/kg dry substance	25.000
Fluoride	F	mg/kg dry substance	500
Sulphate	SO_4	mg/kg dry substance	50.000
Dissolved organic carbon – DOC*	C	mg/kg dry substance	1.000
Total dissolved solids **	-	mg/kg dry substance	100.000

*If the measured value of eluate parameters exceeds the limit value of eluate parameters stated in the table at its own pH value, it may be tested at a pH between 7,5 and 8,0
**The values for total dissolved solids may be used alternatively to the values for sulphate and chloride.
***L/S=liquid/solid

3.2 Additional limit values for waste pollution parameters

Parameter	Expressed as	Unit	Limit value for pollution parameter
Loss on ignition		% dry	10 %

*		substance content	
Total organic carbon – TOC *	C	% dry substance content	6 % **

*Loss on ignition or total organic carbon of stable and non-reactive hazardous waste is used.
** If this value is not achieved, a higher limit value may be admitted by the competent body, provided the DOC value of 1000 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.

ANNEX 4

1. CONTROL OF METEOROLOGICAL PARAMETERS AT THE LANDFILL

1.1 Measurement of meteorological parameters includes daily measurement of the volume of precipitation, temperature, direction and force of wind, atmosphere humidity and evaporation.
1.2 In the after-care phase measurement shall be carried out once a month for the next 5 years.
1.3 Meteorological parameters may be collected from the nearest meteorological station belonging to the national meteorological network.
2. CONTROL OF SUBSTANCE EMISSIONS FROM THE LANDFILL INTO THE AIR
2.1 Measuring of landfill gas concentrations in air includes:
Monthly measuring of the concentrations of CH_4, CO_2 and O_2 in landfill gas during the operational phase and every 6 months after closure.
Measurement of other landfill gases (H_2S and H_2) shall be carried out depending on the composition of the deposited waste or if it is so prescribed in the landfill permit.
2.2 Measurement shall be carried out on a representative number of samples.
2.3 The efficiency of the landfill gas extraction system must be checked on a regular basis.
2.4 If identical measuring results for landfill gas composition and concentration are repeatedly obtained, the period between two consecutive measurements may be extended but cannot be longer than six months.
2.5 In the after-care phase landfill gas concentrations shall be measured every six months.
3. CONTROL OF SUBSTANCE EMISSIONS IN LEACHATE AND PRECIPITATION WATER AT THE LANDFILL
3.1 Measurement of leachate parameters is carried out every three months and includes the volume and composition of leachate during the operational phase and every six months after closure.
3.2 The scope of measuring leachate parameters shall be determined in the water rights permit, pursuant to a special regulation on water protection and/or within the environmental impact assessment procedure.
3.3 As part of measuring the leachate composition, conductivity shall also be measured.
3.4 Parameters which are measured must reflect the leachate properties.
3.5 Measurement shall be carried out on a representative number of samples.
3.6 The scope of measurement of leachate parameters from the shed, manoeuvring areas or covered areas of the landfill shall be determined in the water rights permit, pursuant to a special regulation on water protection.
4. CONTROL OF GROUNDWATER AT THE LANDFILL
4.1 The scope of measuring groundwater parameters shall be determined in the water rights permit pursuant to a special regulation on water protection and/or within the environmental

impact assessment procedure.
4.2 Measurement of groundwater parameters includes measuring of the height of groundwater level and groundwater pollution parameters pursuant to a special regulation
4.3 In the first year of operation measurement must be performed on a monthly basis. If the values of measured parameters remain identical, later during landfill operation measurement of these parameters may be performed once every 3 months, and after closure once every 6 months.
4.4 Groundwater pollution parameters must be measured at one measuring point in the groundwater inflow region and at least two measuring points in the outflow region.

ANNEX 5

WASTE SAMPLING METHODS

For each shipment of waste intended for landfilling one representative sample shall be prepared, while if the shipment contains several batches, a representative sample shall be prepared for each batch separately. The quantity of waste matter in a representative sample shall be at least 1 kg.
When taking individual samples and preparing the representative sample it must be ensured that the composition of the representative sample corresponds to the average composition of the waste contained in the shipment, that is, to the average composition of polluted soil.
The number of individual samples from which the representative sample is prepared is determined according to the size of the shipment, that is, the number of tanks or containers as set out in the Table below:

	Number of tanks or containers	Smallest number of tanks or containers from one batch or shipment from which an individual sample is taken
1.	1 to 3	all
2.	4 to 64	4
3.	65 to 125	5
4.	126 to 216	6
5.	217 to 343	7
6.	344 to 512	8
7.	513 to 729	9
8.	730 to 1000	10
9.	1001 to 1300	11
10.	more than 1301	for each 300 tanks or containers one additional sample shall be taken

For homogenous solid waste an individual sample shall be one random sample taken from one tank or container.
For non-homogenous solid waste an individual sample shall be prepared by taking six samples: from the bottom, from one third of the height, from two thirds of the height, from the exterior lower, middle and upper sections of the pile in the container.
If the container is filled in such a way that the heaped matter does not form a pile in the container, then the first three samples are taken at equal heights from the middle of the

container and the remaining three samples are taken from equal heights along one of the container walls.
These six samples are mixed and quartered in order to prepare the individual sample weighing at least 1 kg, which is further mixed and quartered in order to prepare the representative sample in the same way as for homogenous waste.
Tanks or containers from one shipment or batch from which the individual sample is taken are randomly selected.