Resolution of the Government of Georgia № 421

August 11, 2015 Tbilisi

On Approval of
TECHNICAL REGULATION
ON THE CONSTRUCTION, OPERATION, CLOSURE AND AFTER-CARE OF LANDFILLS

Article 1

According to the part 2 of the Article 58 of the Product Safety and Free Movement Code, sub-paragraph b of the part 1 of the Article 49 of the Waste Management Code and the Articles 12 and 25 of the Law of Georgia on Normative Acts:

1. Approve the attached Technical Regulation on The Construction, Operation, Closure and After-care of Landfills;
2. Existing landfills that were in use prior to the adoption of this Technical Regulation and have not been permitted in accordance with the Law of Georgia on Environmental Impact Permit to submit conditioning plan on bringing the landfills into compliance with the requirements specified in this Technical Regulation to the Ministry of Environment and Natural Resources Protection in accordance with the Section VI of this Technical Regulation within 6 months after its enactment;
3. Abolish the Resolution of the Government of Georgia №416 made on December 31, 2013 on Approval of Technical Regulation on Rules and Norms of Construction and Operation of Disposal Areas for Solid Household Wastes.

Article2

The Resolution shall become effective from August 1, 2015.

Prime Minister Irakli Gharibashvili

TECHNICAL REGULATION
ON THE CONSTRUCTION, OPERATION, CLOSURE AND AFTER-CARE OF LANDFILLS

Section I- General Provisions

Article 1 - Purpose of this Technical Regulation

1. The aim of the Technical Regulation on the Construction, Operation, Closure and After-care of Landfills (hereinafter - Technical Regulation) is to prevent or minimize the negative impacts of landfills on environment, especially on surface water, groundwater, soil and atmospheric air (including greenhouse effect), and on human health, via establishing strict operation and technical requirements, measures and procedures for wastes and landfills, during the entire lifecycle of a landfill.

2. ThisTechnical Regulation establishes:

   a) Technical rules and regulations for landfill construction, operation, closure and post closure care.

   b) Special requirements for existing landfills (that have not been permitted in accordance with the Law of Georgia on Environmental Impact Permit) on bringing the landfills into compliance with the requirements specified in this Technical Regulation.

   c) Waste acceptance criteria and procedures and safety requirementsfor waste underground storage.

Article 2- Definitions

1. The terms used in this Technical Regulation have the same meaning as the terms defined in the Article 3 of the Waste Management Code.

2. For the purposes of this Technical Regulationother terms have the following meaning:

   a) **Landfill gas** means all gases generated from the landfilled waste;

   b) **Landfill life cycle** means the period from the construction of the landfill until its closure and completion of the post-closure after-care period;

   c) **Landfill operator** means the natural or legal person authorized to manage the landfill (This person may be different at the various stages of the landfill life cycle from landfill preparation to after-care phase);

   d) **Leachate** means any liquid percolating through deposited wastes and emitted from or contained within a landfill;

   e) **Post-closure after-care of the landfill** means a set of activities oriented at maintenance of the landfill site after its closure, implementation of environmental measures and elimination of negative consequences of the landfill impacts on the environment and human health to be implemented during the period determined by the Ministry of Environment and Natural Resources Protection of Georgia (hereinafter – the Ministry) and according to the requirements specified by the permit;

   f) **Underground storage** means a permanent waste storage facility in a deep geological cavity.

Article 3 - Scope of Application

1. This Technical Regulation shall be applied to the landfills considered by the Waste Management Code.

2. This Technical Regulation does not apply to:

    a) Spreading of sludge (including sewage sludge) and similar matter derived from wastewater treatment plants and dredging operations on soil for the purpose of fertilization or improvement of soil quality;

    b) Use of inert waste which is suitable for site grading, filling or for landfill construction and management purposes;

    c) Deposit of non-hazardous dredging sludge alongside waterways from where the material was dredged and in surface water bodies including their bed and subsoil;

    d) Deposit of unpolluted soil or non-hazardous inert waste that is derived from the exploration, extraction, processing and storage of mineral resources as well as from the operation of quarries.

Article 4 - Landfill Categories

1. Each landfill shall be classified in one of the following categories:

    a) Landfill for hazardous waste,

    b) Landfill for non-hazardous waste,

    c) Landfill for inert waste.

2. In cases where there are individual and separated sections and/or cells within a landfill for disposal of more than one type of waste, the individual sections or cells are to be classified in accordance with the Paragraph 1 of this Article as different sub-sites.

Article 5- General Obligations of the Landfill Operator

1. The landfill operator shall ensure that a landfill is constructed, operated, closed and maintained in accordance with the requirements of the Waste Management Code, this Technical Regulation and the standards established by the Georgian laws, not pose a threat to human health and the environment.

Article 6 –Disposal of Wastes at Landfills

1. The following types of waste are prohibited from disposal at landfills:

    a) Liquid waste;

    b) Waste which, when placed into the landfill, is explosive, corrosive, oxidizing, highly flammable or flammable, as defined by waste characteristics in Annex III of the Waste Management Code;

    c) Hospital and other clinical waste, derived from medical or veterinary establishments, which is infectious as defined in property H9 in Annex III of the Waste Management Code;

    d) Whole used tires (excluding bicycle tires, tires used as an engineering material for construction of landfills and shredded tires);

e) Any other type of waste which does not meet the acceptance criteria defined in the Annex of this Technical Regulation.

2. The creation of a mixture to accomplish a dilution of waste solely for the purpose of meeting the waste acceptance criteria is prohibited.

3. The targets of reduction of landfilled biodegradable municipal wastes and relevant measures are specified by the Biodegradable Municipal Waste Management Strategy in accordance with the Waste Management Code.

Article 7 – Treatment of Waste prior to Landfilling

1. Permitted landfills shall accept only treated wastes;
2. The first Paragraph of this Article does not apply to:
   a) Inert waste which treatment is not technically feasible;
   b) Other types of waste in cases, when waste treatment will not contribute significantly to the reduction of the hazardous characteristics of the waste and the risk to human health and the environment that may be caused by the wastes during the entire life cycle of the landfill.

Article 8– Content of the Application for a Landfill Permit and Required Information

1. The application for a landfill permit shall comply with the requirements of the Law of Georgia on Environmental Impact Permit and contain the following:

   a) Identity of the applicant and the operator when they are different entities;

   b) Category of a landfill, codes of wastes to be landfilled assigned in accordance with the list of wastes approved by the Resolution of the Government of Georgia on Approval of the List and Categories of Wastes by their Type and Characteristics, and total quantity of waste to be accepted;

   c) Proposed design capacity of the disposal site and its cells;

   d) Detailed description of the proposed disposal site, including its location, GIS coordinates, topographical, hydrogeological and geological characteristics (results of the relevant surveys);

   e) Pollution prevention and reduction methods;

   f) Operation, monitoring and control plan;

   g) Closure and post-closure after-care plan;

   h) Landfill design plans, description of technical service infrastructure, anticipated sequence of construction and operation of sections and cells and their numbering;

   i) Waste acceptance and verification procedures;

   j) A detailed description of activities related to design and operation.

2. The Ministry shall issue a permit if the following requirements are met:

   a) Landfill project meets the requirements of the Waste Management Code and this Technical Regulationand complies with the Waste Management National Strategy and Action Plan;

   b) Professional and technical training of landfill personnel will be provided;

c) Allnecessary measures are taken to prevent accidents and minimize their consequences on the landfill operation stage.

3. After the application for permit has been duly satisfied in accordance with the rule established by the legislation, the information shall be made available for statistical purposes to relevant authorities upon request.

Section II

Requirements for Design and Construction of Landfills

Article 9–Location of a Landfill

1. Landfills shall not be constructed within the first and second zones of sanitary protection and water protection zones;
2. The distance between the boundaries of the landfill and the nearest settlements shall exceed 500 m;
3. The distance between landfills of non-hazardous waste and aerodromes shall meet the ICAO (International Civil Aviation Organization) requirements.
4. During the selection of landfill area the following shall be considered:
    a) the risk of flooding, soil subsidence, landslides or avalanches;
    b) geological and hydrogeological conditions;
    c) the risk of pollution of groundwater and the existence of protected areas, natural or cultural monuments in the given area.
5. The area and volume of the landfill shall be determined on the basis of data related to:
    a) The topographical, engineering, geological, hydrogeological and hydrologic conditions at the proposed site;
    b) The type, amount and composition of the waste to be landfilled;
    c) The period of time when the landfill will be active in receiving acceptable waste.

Article 10 – Design Vertical Elevations and Topography of Landfills

The vertical elevations and topographical configuration of all engineering facilities at the landfill shall be designed and constructed to:

a) Ensure topography that optimizes the landfill construction work and maintenance of its structures and systems and, to the degree possible, ensure the maximum preservation of the existing natural topography of the site;

b) Ensure the optimum utilization of the existing engineering, geological, and hydrogeological conditions of the landfill site and the landfill technology specified at the landfill design stage and assure that the slope gradients for the final side slopes and crest of closed landfill surfaces meet the requirements of this Technical Regulation;

c) Achieve a balance of required excavation and filling during construction for the purpose of the use of excavated materials during landfill operation and closure processes;

d) Protect the landfill site from flooding due to surface water flow;

e) Ensure, if possible, gravity flow for conducting leachate to retention basins and/or treatment systems;

f) Create conditions for an efficient functional layout of all landfill infrastructure including sections, cells, buildings, leachate and gas management systems and all support infrastructure.

Article 11 -Water Control and Leachate Management

1. During construction of a landfill appropriate measures shall be adopted and meteorological conditions shall be taken into account to:
    a) Control water flows generated on the landfill site during precipitation;
    b) Prevent the penetration of underground and/or surface waters into landfilled wastes;
    c) Collect contaminated water and leachate;
    d) Process contaminated water and collected leachate.
2. Based on the decision of the Ministry the requirements of the Paragraph 1 of this Article may not apply to inert waste landfills and also to those landfills that do not pose threat to the environment and human health according to the results of geological, hydrogeological and hydrological surveys and the assessment of characteristics of wastes to be landfilled.

Article 12 - Soil and Water Protection

1. The location and design of the landfill shall be planned in a manner that ensures prevention of soil, groundwater and surface water pollution and effective collection of leachate. The protection of soil, groundwater and surface water will be achieved by means of the combined function of geological barrier and bottom sealing layer during the operational phase of the landfill and by means of geological barrier and upper sealing layer during the post-closure after-care phase of the landfill.
2. The type of a geological barrier shall be determined by the geological and hydrogeological conditions below and in the vicinity of the landfill to prevent soil and groundwater pollution and minimize associated risks.
3. The landfill base and sides shall consist of mineral layers that meet the permeability and thickness requirements in terms of protecting soil, groundwater and surface water resources at least equivalent to the following coefficient:
    a) Landfills for hazardous waste: $K \leq 1{,}0 \times 10^{-9}$ meters/second (m/s) and thickness ≥ 5 meters;
    b) Landfills for non-hazardous waste: $K \leq 1{,}0 \times 10^{-9}$ m/s and thickness ≥ 1 meter,
    c) Landfills for inert waste: $K \leq 1{,}0 \times 10^{-7}$ m/s and thickness ≥ 1 meter.
4. In a case where the geological base naturally does not meet the conditions stipulated in the Paragraph 3 of this Article, other artificial means can be used to achieve equivalent results.
5. Artificially enhanced geological shall be no less than 0.5 meters thick.
6. For leachate collection from landfills for hazardous and non-hazardous waste, a sealing system shall be installed in addition to the geological barrier. This shall be accomplished through the utilization of an:
    a) Artificial sealing liner
    b) Drainage Layer (≥0.5 m)
7. Due to potential threat to the environment the Ministry could recommend use of upper sealing system to prevent the leachate from the landfill:

a) For nonhazardous waste landfill – gas drainage layer, impermeable mineral layer, drainage layer (≥0.5 m) and Top Soil Cover (>1 m);

b) For hazardous waste landfill - artificial sealing liner, impermeable mineral layer, drainage layer (≥0.5 m) and Top Soil Cover (>1 m).

8. During permitting process the Ministry may not fully impose the requirements specified in this Article if based on the results of environmental risk assessment the collection and treatment of leachate is not necessary or landfill does not pose a threat to soil, groundwater and surface water.

Article 13 - Landfill Gas Management

1. The landfill operator shall conduct an assessment to determine the presence of gas emissions from the waste mass of non-hazardous waste landfills. At all landfills receiving biodegradable waste a system for the collection of landfill gas shall be installed.
2. Where gas emissions are detected, the gas shall be captured by means of a gas collection system where the collected gas is utilized for energy recovery or combusted through use of a flaring system.
3. The materials used for installation of a gas drainage system shall be resistant against chemical and biological substances contained in gases emitted from the landfill and ensure retention and transportation of gases to their treatment location.
4. In all instances, the collection, treatment and use of landfill gases shall be accomplished in a manner that does not create a risk to human health and the environment including considerations of climate related effects.

Article 14 - Requirements to the Geological Base

1. An appropriate geological base shall be selected for the landfill bed by considering the following criteria:
    a) The landfill base's carrying capacity and stability that is sufficient to prevent in the course of its loading due to waste placement;
    b) The qualities necessary to keep penetration and migration of pollution from the landfill's accumulation of waste.
2. The geological base shall be structurally sound and able to contribute to the environmental protection aspects of the landfill:
    a) Appropriate tests shall be performed for the anticipated combination of structural loads to ensure the stability of the landfill base and its side slopes;
    b) Expected deformations (settlement under its own weight, subsidence, etc.) shall be determined through assessment modeling. The results of the deformations assessment shall be confirmed or adjusted after commencement of landfill operations through monitoring and measurements of the actual settlement that will occur during landfill operations by means of geodesic surveys based on benchmarks placed at every 3 hectare of landfill area.
3. The base shall be formed by longitudinal and transverse slopes facilitating leachate run-off and promoting landfill bed stability.
4. Where the requirements specified by the Paragraph 3 of the Article 12 have not been met on the existing natural ground base, the design of the foundation for the landfill bottom liner shall make provisions for appropriate technical construction processes intended to ensure protection against the harmful impact of the landfill, including:

a) Consolidating the ground base through compaction, replacement of any unstable ground base with appropriate material through the introduction of layers of bound material with a clay particle content greater than 10% and compacted to reach a coefficient of compaction greater than or equal to 0.95%, reinforcement of an unstable ground base (including slopes) by using geotextile, and soil consolidation methods;
b) Inclusion in the bottom liner system of an enhanced mineral layer, geomembrane, a geomembrane protection layer and an intermediate layer.

5. The average annual table of ground water in the ground base beneath the landfill bed shall be at a depth greater than 1 meter below the foundation elevation. Landfills classified to receive only inert waste may have a smaller depth indicator for ground water based on the decision of the Ministry.

Article 15 - Landfill Bottom Liner System

1. The bottom liner shall be designed as a system for lining the landfill bottom and side slopes which shall include the following components (from the bottom up):
    a) bedding;
    b) impermeable mineral layer;
    c) geomembrane;
    d) protective layer of geomembrane;
    e) drainage system;
    f) intermediate layer.
2. The type and specification of the individual components of the layer shall depend on:
    a) The nature of the ground base in its capacity to serve as an effective geologic barrier against the penetration of leachate and its accompanying pollution from the landfill waste mass;
    b) The proposed landfill technology and operational processes;
    c) The geotechnical properties of the waste placed into the landfill.
3. Some of the individual liner components (such as the geomembrane, protective layer and bedding) may not be requiredbased on the decision of the Ministry depending on the assessed degree of risk to the environment and human health.
4. The bottom liner, together with the geological base and the side slopes, shall be designed with a required carrying capacity and stability to support the expected structural loads anticipated at the landfill.
5. The bottom liner installed along the slopes of excavations and embankments shall be designed for its overall stability against slippage, together with the geomembrane and its protective layer. The coefficient of reliability shall be determined for cases such as:
    a) Slippage at the contact surface between the geomembrane and the clay mineral capping;
    b) Slippage at the contact surface between the geomembrane and its protective layer.
6. The required design calculations to assure stability shall be prepared for a basic combination of loads without taking seismic impact into consideration. In the case of an unsatisfactory result of the design calculations under the Paragraph 5, plans shall be made independently or in combination for the following technical measures aiming to meet the design value of the coefficient of reliability:

a) Reduction of the slope gradient;

b) Increasing the interface surface friction coefficient by means of a selection of structured geomembranes which shall ensure the necessary friction coefficient to prevent slippage;

c) Reinforcing the mineral capping, protective layer or drainage system layer with a geonet, the parameters of which shall be based on the design calculations.

Article 16 - Bedding

1. Installation of a bedding layer shall be necessary for wherever there is a need to consolidate the landfill ground base.
2. The type, content and manner of installing the bedding material shall depend on the results of the geologic and hydrogeological surveys and the requirements towards achieving the required carrying capacity and landfill bed stability.
3. Where a bedding for the landfill is planned on the basis of the results of geologic and hydrogeological surveys and the requirements towards the carrying capacity and landfill bed stability, this bedding shall have a thickness greater than 0.5 meters.

Article 17 - Impermeable Mineral Layer

1. The impermeable mineral layer shall be designed to:
    a) Provide protection against percolation and diffusion of harmful substances;
    b) Be highly water impervious;
    c) Be resistant to leaching as a result of its low permeability;
    d) Have a heavy metal-retention capacity;
    e) Settle within the design limits and be capable of self-consolidation through a suitable selection of materials for their plasticity and granulometric content;
    f) Ensure that, in the event of a change in the hydrogeological conditions at the landfill site, deformations shall remain within the design limits.
2. The impermeable mineral layer shall have a thickness of a minimum of 0.5 meters for non-hazardous waste landfills and a minimum of 0.75 meters for hazardous waste landfills. The mineral layer shall be placed over the prepared ground base surface or over the bedding.
3. The impermeable mineral layer for hazardous and non-hazardous waste landfills shall consist of natural homogeneous clay soil with a permeability coefficient of less than or equal to $1x10^{-9}$ m/s.
4. The impermeable mineral layer shall have a design longitudinal slope of at least 1% and a transverse slope to the drain pipes for landfill leachate collection of at least 3%.
5. The installation of the impermeable mineral layer shall utilize construction technologies by which the individual layers of the impermeable mineral layer are compacted to a coefficient of compactness greater than or equal to 0.97%.
6. The impermeable mineral layer materials shall have the content, physical properties and condition of individual layers that are sufficient to result in the required permeability level.

7. Whenever landfill slopes have a gradient greater than 1 to 2.5, slope mineral layers shall be installed in horizontal layers, where the layer thickness measured under a 90 degrees angle to the slope plane is a minimum of 1.7 meters.

Article 18 - Artificial Sealing Liner (Geomembrane)

1. The artificial sealing liner (geomembrane) shall be considered for all hazardous and non-hazardous landfills.
2. The artificial sealing liner shall:
    a) Absorb deformations resulting from settlement of the mineral layer and ground base;
    b) Provide, together with the mineral layer and ground base, protection of the geologic base and groundwater against leakage and percolation of the leachate generated from the accumulated waste mass;
    c) Be chemically resistant to waste-generated leachate impact.
3. The geomembrane material (high-density polyethylene, polypropylene, PVC and others) utilized to create the artificial sealing liner shall be at least 2 mm thick, 4 m wide and have a smooth or coarse texture with following characteristics:
    a) Tensile resistance at a temperature of 23^{o}C greater than or equal to 400 N;
    b) Tensile resistance at a temperature of 70^{o}C greater than or equal 0.25 of the tensile strength at a temperature of 23^{o}C;
    c) Capacity of stretching of a 50 mm wide strip greater than 5%;
    d) Resistance to point-source penetration determined by a maximum fall height without penetration of greater than 750 mm at a point-source impact load of 500 g;
    e) Welding physical strength of the separate geomembrane panels greater than 90% of the material strength in the case of partially crystallized polymers and at least 60% in the case of amorphous polymers.
    f) When exposed to leachate impact, lose no more than 15% of its weight and diminish by no more than 25% of its physical properties;
    g) When exposed to impact of the gas generated by the waste mass, diminish by no more than 20% of its physical properties;
    h) When exposed to microorganism impact, lose no more than 5% of its weight and diminish to no more than 15% of its physical properties;
    i) The ability to resist root intrusion;
    j) The ability to resist rodent intrusion

Article 19 - Protective Layer of the Geomembrane

1. Consideration shall be made for providing a protective layer for the geomembrane. Where the presence of a protective layer is justified, the latter may be composed of nonwoven geotextile of an adequate area mass, or another appropriate material.
2. The function of a protective layer can also be provided by the blanket drainage layer comprised of and installed in accordance with the requirements of this Technical Regulation.

Article 20 - Drainage System (Drainage Layer)

1. The drainage system shall be designed to collect and remove leachate from the landfill bed. The drainage system shall consist of a blanket drainage and a drainage piping network with the following physical characteristics:
    a) The blanket drainage layer shall have a thickness of greater than 0.50 meters of washed rubble with a filtration permeability coefficient of greater than or equal to $1x10^{-3}$ m/s in order to be able to retain its stability and function over long-term landfill

operation and loading conditions. The granulometric content of the material utilized as a drainage layer shall range between 16 to 32 mm and, if deviations occur, the maximum pore fraction volume shall be between 16 to 32 mm. The calcium carbonate content of the drainage material shall not exceed 20% by weight;

b) A horizontal pipe network shall be installed that is capable of diverting leachate out of the landfill bed. Where practical, inspection shafts shall be installed at every horizontal pipe bend within the pipe network. This requirement shall include a consideration of required function throughout the operational and post-closure after-care phases of the landfill life cycle. All piping and fittings utilized for the horizontal pipe network shall be sufficiently sized for all leachate flow conditions, have sufficient structural strength and be capable to resist the chemical and biological impact of leachate on the function of the drainage network.

c) A pipeline for transporting leachate outside the landfill bed will be required to avoid penetration of leachate into the landfill liner system.

2. The drainage network shall comply the following requirements:

a) Ensure the collection and removal of leachate from the landfill bed, including leached particles, at a minimum velocity of $1x10^{-3}$ m/sec;

b) Provide a means for easy and effective operation, maintenance and inspection;

c) Prevent clogging due to leachate-related solid materials or through chemical precipitation related to the leachate characteristics.

3. The drainage network shall be composed of pipes with a minimum diameter of 300 mm, two-thirds of the surface of which is punctured or has slits for leachate access, at a minimal transverse and lateral slope of the pipeline track required to achieve the minimum flow velocity in accordance with the Paragraph 2 of this Articleand a maximum distance between the drainage network pipes of 30 meters. Drainage pipes and their junctures shallbe capable of withstanding the load and deformations of the overlying landfill bed and the ability to undergo high-pressure flushing on a periodic basis.
4. The drainage inspection shafts shall be designed and sized in consideration of the temporary loads exerted by compacting machines and the temperature impacts resulting from the irregular warming of the waste mass due to internal biological action. Settlement associated with the leachate drainage piping shall not differ from that of the landfill bed, when necessary constructive measures shall be taken. The shafts shall be built into the process of waste landfilling as necessary for effective leachate control and removal.
5. A retention basin shall be considered as a mean for temporary leachate storage.
6. A wastewater treatment plant, wastewater discharge facility and pump station shall be considered for transferring leachate to the landfill bed and waste accumulation for recirculation or to a designated offsite wastewater treatment location capable of receiving and treating the landfill leachate.

Article 21 - Top Surface Liner

1. The top surface liner shall consist of:

a) levelling (adjusting) layer;

b) gas drainage (ventilation) layer;

c) impermeable mineral layer;

d) artificial sealing liner (geomembrane);

e) geomembraine protective layer;

f) drainage system;

g) recultivation layer.

2.The physical characteristics and composition of the individual elements of the surface sealing system shall depend on the properties of the landfilled waste.

3. The top (surface) sealing system shall be designed to:

a) Provide protection against penetration of atmospheric and surface water into the landfill waste mass;

b) Provide protection of air and surface water against contamination resulting from the waste accumulated in the landfill;

c) Meet the aesthetic requirements of the landfill;

d) Comply with the conditions required for the intended use of the landfill's post-closure rehabilitated surface layer.

4. Landfill recultivation shall be performed in graduated steps, following the closure of each cell or separate landfill section.

5. The top sealing system shall be designed for total stability. It must ensure the external stability of landfill slopes against slippage and sliding and against deep circular-cylindrical slipping once the recultivation layer has been installed. Tests and calculations shall be made to verify stability with a consideration of the expected loads taking into account the seismic forces.

6. The top sealing system shall comply with a geometric arrangement of the surface of the completely filled landfill, depending on:

a) The design capacity and final configuration of the landfill surfaces;

b) The projected settlement of the landfill bed and landfill waste mass; and

c) Aesthetic considerations for landscape harmonization.

7. The top sealing system shall be installed after landfill elevations have reached the design grades defined in the approved landfill design plan.

8. The design crest and slope gradient of the depleted landfill shall be determined with the consideration of the expected settlement where the final surface shall remain at between 2 to 5% after settlement has occurred. The slope gradient shall be determined on the basis of calculations for total stability and sliding (slippage) at a maximum side slope steepness ratio of 1 to 2.5.

Article 22 - Levelling (Adjusting) Layer

1. The levelling layer overlying the surface of the disposed waste once it has reached its design elevations and shall provide:

a) Protection of the environment during the landfill operations by means of spreading a soil levelling layer over the upper surface of the body of waste;

b) The regular distribution of the structural loading from other elements of the surface lining system onto the waste mass;

c) Conducting drainage of the gas emitted from the waste mass.

Article 23 - Gas Collection System

1. Gas drainage system consists of:

    a)Drainage layer;

    b) Gas collection and discharge pipe

2. Where gas emissions are detected, the gas shall be captured by means of a gas collection system of 0.5 m thickness.
3. Vertical gas extraction wells of the gas collection system shall meet the following minimum requirements:

    a) They shall be constructed in parallel to the waste landfilling after the first operating horizon;

    b) They shall have a design diameter of 0.8 to 1.0 meters of washed drainage material with a grain size of 30 to 100 mm;

    c) They shall be installed at a design spacing distance of 50 to 100 meters depending on the expected generation of landfill gas.

Article 24 - Impermeable Mineral Layer

1. The mineral layer for the top sealing system shall be utilized to protect the landfill waste mass from infiltration by rain and surface water and to act as a barrier against gas emissions.
2. The mineral capping layer shall meet the requirements ofthe Article 17 and shall be sloped in accordance with theParagraph 8 of the Article 21.
3. The mineral capping layer shall be protected against frost action and root intrusion.

Chapter 25 - Geomembrane and Geomembrane Protective Layer

1. A geomembrane and a geomembrane protective layer shall be utilized for landfills where the mineral capping is not sufficient to provide protection for waste mass against infiltration of atmospheric and surface water and cannot serve as a sufficient barrier against gas emissions.
2. The geomembrane and the geomembrane protective layer shall comply with the requirements of the Article 18, and its protective layer shall also comply with the requirements of the Article 19. The thickness of the geomembrane shall not be less than 2 mm and shall be designed with a consideration of the subsidence expected in the landfill waste mass as a result of natural compaction and decomposition of the contained waste.

Article 26 - Drainage System

1. A drainage system shall be considered for the purpose of protecting the landfill's waste mass against the infiltration of rain and surface water.
2. The drainage system shall be comprised of:

    a) A blanket drainage layer meeting the same requirements as the bottom liner drainage layer;

    b) Drain pipes aimed at ensuring the effective collection and removal of surface water away from the mineral capping layer or geomembrane.

3. The drainage system shall be capable of enduring the load and impact of the recultivation layer and continue to function with the prospects of waste mass subsidence as a result of waste mass compaction and decomposition processes.
4. The drainage system shall be designed to:
    a) Endure effective surface runoff created as a result of an intense precipitation event with a probability of exceedance of 10%;
    b) Have flow stability;
    c) Be wear resistance;
    d) Meet the requirements associated with winter conditions at the landfill site and winter operations of its systems;
    e) Meet the requirements of effectively diverting rain and collected water to avoid the contact of uncontaminated water with the waste mass within the landfill.
5. Drainage channels or diversion berms shall be constructed surrounding the landfill terrain and the roads for the waste delivering trucks to serve as a means of controlling the surface and atmospheric water from potentially polluted locations with the landfill.

Article 27 - Recultivation Layer

1. The recultivation layer shall be designed to comply with the proposed post-closure use of the landfill area (for recreation, and other purposes).
2. The technical and biological processes associated with the recultivation layer shallprotect the crest and slopes of the landfill against erosion due to gravity, wind action, rainfall impact and runoff.
3. The surface stabilization and biological rehabilitation of closed landfill surfaces and other surface areas outside of the landfill surface and waste accumulation zones shall be accomplished through the use and cultivation of grass, bushes and trees that are typical of the landfill site region and that have appropriate erosion protection, decorative characteristics and resistance to all substances potentially released from the accumulated waste within the landfill into the ambient air and soil. Selected cultivation materials shall not damage the integrity of the impermeable mineral layer of the surface sealing system.

Article 28 – Auxiliary/Service Buildings and Systems Required for the Operation of the Landfill

1. The need for auxiliary/service buildings and systems supporting the operation and maintenance of the landfill shall be determined on the basis of the overall area and configuration of the landfill, the level of expected daily waste receipt, the landfilling technology and design utilized, and the requirements of this Technical Regulation.
2. A fence and access control checkpoint is required to provide sufficient physical protection and security of the landfill and prevent unrestrained access to the landfill site. All access control features shall be maintained in good working order during the entire operational and after-care phases of the landfill.
3. Other facilities and/or installations for treatment of waste (sorting, recycling, composting, etc.) may also be constructed at a landfill site. A decontamination site shall be considered for treatment of vehicles moving into and out of the landfill.

Article 29 – Additional Requirements to Construction of Landfills

1. All materials, products and systems utilized in the construction of the landfill, as well as technical specifications defining their physical characteristics shall comply with the requirements of this Technical Regulation and ensure required long-term prevention of the landfill pollution.
2. Landfill shall be constructed through:
    a) Consideration of the rules (requirements) relevant to the control of construction standards and activities, test launch and commissioning of all constructed elements;
    b) Conformityof all landfill systems and components to the requirements of this Technical Regulation and landfill permit conditions and confirmation of this conformity.
3. In constructing the landfill liner system, precautions shall be taken to assure that all seaming of the side and bottom liner geomembrane components are installed in a manner that assures the complete and effective function of the lining system in preventing leachate discharge and providing a means for its effective collection.
4. Where necessary, the surface drainage and diversion system preventing water contact with the deposited solid waste shall be constructed prior to the bottom liner system geomembrane placement and seaming.
5. Any landfill side slope geomembrane components shall be installed as a continuation of the bottom liner geomembrane and shall encompass the entire internal sides of the side dikes.
6. Bottom liner system component installations (including the deployment and seaming processes associated with geomembranes, if required) shall assure that:
    a) Base and settlement deformations caused by expected waste loadings shall not endanger the integrity of the base liner geomembrane and the liner as a whole;
    b) The design and quality of the materials to be used in the bottom liner and top sealing liner systems shall comply with the requirements of this Technical Regulation;
    c) The compliance of the degree of compaction, water content and homogeneity of the materials used in the mineral layerduring constructionwith the criteria of this Technical Regulation shall be determined through testing and compliance ofeach 1000 m^2 of liner surface area;
    d) All design elevations and slope gradients shall complies with values stipulated in the approved landfill design;
    e) The thickness of all soil materials utilized as a component of the landfill base liner and surface sealing system design shall be verified at each 100 $m^2$of the installed material;
    f) The permeability coefficient of the installed mineral layers shall be verified by running an applicable laboratory or field test once every 2000 m^2 of installed surface area.

Section III

Operation and Technical Maintenanceof the Landfill

Article 30 - Personnel Employed in the Operation of the Landfill

1. Landfills shall be managed by the personnel that have attended training courses on landfill management approved by the Ministry.
2. Landfill operator shall ensure that all personnel employed in operations and maintenance at a landfill shall be subject to initial and periodic training as well as regular qualification upgrading.

3. At a minimum, the trainings shall include:
    a) Landfill management, including onsite verification of waste and landfill operations and maintenance procedures;
    b) Obligations related to environmental and health/safety protection and responsibilities of the landfill operator and personnel in meeting these obligations.
4. Individuals working at the landfill shall be admitted to work at a landfill only after receiving introductory training and instructions.

Article 31 - Acceptance of Waste

1. Only waste for which composition and physical/chemical characteristics, leachability and long-term behavior properties are known through Basic characterization shall be allowed to be placed into a landfill.
2. Hazardous, non-hazardous and inert waste shall only be placed in a landfill or landfill area classified for receipt of that particular waste type.
3. The procedure and criteria for acceptance of waste at the different landfill classificationsincluding the methods utilized for sampling and testing are specifiedin the Annex of this Technical Regulation.
4. In an application for a landfill permit, the landfill operator shallspecify the identification code and the name of the waste to be accepted at the landfill as defined in the List of Wastes approved by the Resolution of the Government of Georgia on Approval of the List and Categories of Wastes by their Type and Characteristics.

Article 32 - Waste Acceptance Criteria

1. Criteria for acceptance of waste at a specificclassification of landfill shall be determined with the aim ofprotecting the environment, especially groundwater, surface water and air;preserving environmental protection systems, including protective layers and leachate processing systems;ensuring the effectiveness of the waste stabilization processes and protecting human health fromharmful impacts.
2. To achieve the required performance defined in Paragraph 1of this Articleand to comply withthe criteria for waste acceptance related to the different landfill classifications, waste acceptance shall be based on the followingcriteria:
    a) Waste type;
    b) Waste composition and characteristics;
    c) Amount of organic substances in the waste;
    d) Biodegradability of the organic waste components;
    e) Quantity of hazardous components in the waste;
    f) Leachability of the hazardous components in the waste;
    g) Eco-toxicological characteristics of the waste and the generated leachate.

Article 33- Testing of Waste

1. To determinethe acceptability of specific waste forms for a specific classification of landfill, testing of the waste shall be required and accomplished in the three stages:Basic Characterization, Compliance Testing and Field Verification.
2. Basic Characterization:
    a) Basic characterization analysis of the waste shall be provided by the waste owner for review and acceptance by the landfill operator.
    b) Basic Characterization shall be accomplished through internationally approved analysis methods and proceduresthat determine the behavior of the evaluated waste in conditions of the landfill by determining the short and long-term leaching and/or composition and characteristics of the waste.
    c) For a waste to be acceptable, the Basic Characterization shall demonstrate that the waste complies with all criteria for acceptance of the waste as defined in Annex of this Technical Regulation and in the terms of permit.
3. Compliance testing shallinclude periodic testing of wasteby simplified procedures for determining consistency of waste with the results of the Basic Characterization. Compliance Testing shall be done by the landfill operator at least annually.
4. Onsite field verification shall include a visual inspection of each load of the waste received at the landfill to confirm that the received waste is exactly the waste that was subjected to Basic Characterization and Compliance Testing. Inspecting personnel shall be trained on the observable physical characteristics of individual waste streams to be verified during the field verification at the time of waste receipt.
5. All test results and reports shall be retained by the landfill operator for a minimum of 3 years.Retained testing results and reports shall be submitted to the Ministry upon request.

Article 34- Waste Acceptance Procedures

1. Required documentation relevant to wasteshall be submitted by waste holder to landfill operator (before or at a moment of waste delivery, or at a moment of initial delivery of regular waste streams if waste type remains the same) as a proofthat the waste complies with the relevant acceptance criteria and the terms of a landfill permit.
2. The landfill operator shall implement the following:
    a) Verification of the documentation;
    b) Determination of the amount of waste through the use of a weighbridge;
    c) Visual inspection of the waste prior to their acceptance and landfilling;
    d) Collection of random representative samples of the waste;
    e) Maintenance of a record on accepted and disposed waste and reporting in accordance with the Resolution of the Government of Georgia on the Form and Content of Waste Registration and Reporting.
3. Landfill operator shall notify the Ministry in case of:
    a) non-acceptance of any waste load(s);
    b) delivery of waste the import of which is not allowed by the Law of Georgia on Transit and Import of Waste into and out of the Territory of Georgia.
4. Landfills classified for hazardous waste shall accept only hazardous waste;

5. Landfills classified for non-hazardous waste shall receive only:

    a) Municipal wastes that fulfill the criteria for the acceptance of waste at a non-hazardous landfill;

    b) Stable, non-reactive hazardous waste (e.g., solidified, vitrified), with leaching potential equivalent to that of non-hazardous waste fulfilling the acceptance criteria in accordance with Part2of the Annex of this Technical Regulation. If accepted, this stable, non-reactive hazardous waste shall not be deposited in cells where biodegradable non-hazardous waste is deposited.

6. Landfills classified for inert waste shall receive only inert waste.

Article 35- Obligations of the Landfill Operator for Operation and Maintenance

The landfill operator shall ensure that:

a) All necessary measures are taken to prevent and minimize the dangers and damages caused by the emissions of odors and dust, wind-blown waste, noise and traffic sources, birds, vermin and insects, fires and any other aspects related to the function of the landfill.

b) The territory of the landfill is adequately safeguarded and protected to prevent free access to the landfill site and illegal dumping.

c) All necessary personnel and equipment are provided to collect any waste in areas adjacent to the landfill that is inadvertently deposited from the landfill or waste delivery trucks.

d) Landfill personnel are provided to designate waste discharge locations and to control vehicular traffic at the landfill active receipt location.

e) Compaction is provided by means of a bulldozer, roller or compactor to assure the maximum practical density of waste placed into the landfill.

f) Soil cover is placed on landfill surface on a daily basis if the temperature is above $+5^0$C and no later than 3 days after storing in the temperature under $+5^0$C.

g) Record and reporting on accepted and disposed waste is maintained in accordance with the Resolution of the Government of Georgia on the Form and Content of Waste Registration and Reporting.

h) Ensure proper operation of all landfill systems and facilities.

i) Maintenance of all internal access roads to optimize waste delivery.

j) Information on amount and composition of accepted and landfilled wastes is available for statistical purposes to relevant authorities upon request made in accordance of the rule established by the legislation.

Section IV

Landfill Control and Monitoring Procedures during Operation and Post-Closure After-Carephase

Article 36–Purpose of Landfill Control and Monitoring Plan

1. The purpose of a landfill control and monitoring planis to provide the minimum requirements to landfill monitoring during operation and post-closure after-care phase to assure that:

a) Waste accepted for disposal is in accordance with the criteria set for the classification of a landfill where disposal occurs;

b) The processes utilized at the landfill are in accordance with the landfill permit conditions;

c) The environmental protection systemis functioning fully;

d) The permit conditions are met.

2. Monitoring activities shall include a minimum set of procedures necessary for ensuring and control the compliance of all waste and landfill related activities includingthose related to the function of the top and bottom liners as well as the leachate and gas collection system (in the cases where these systems are required), with the design requirements.

3. The monitoring of the required control indicators related to the surrounding environment and its parameters shall be performed in compliance with the requirements of permit.

4. The monitoring results shall be submitted to the Ministry as frequently as established by permit conditions, but not less than once a year.

Article 37 – Meteorological Data

1. The frequency of measurements necessary to effectively determine leachate volumes related to the landfill's water balance to be carried out based on the results of field monitoring and the data obtained from the nearest hydrometeorological stations shall be determined in accordance with this Article:

a) Precipitation quantity - during operations and post-closure after-care phase - daily;

b) Temperature (minimum, maximum)-during operations and post-closure after-care phase - daily;

c) Wind direction and strength - during operations – daily;post-closure after-care phase – not required;

d) Humidity - during operations and post-closure after-care phase – daily.

2. The data collected in accordance with the Paragraph 1 of this Article shall be submitted to the Ministry upon request.

Article 38. Surface Water, Leachate and Gas control

1. The frequency of monitoring of leachate, surface water and gas emissionsshall be as follows:
   a) Leachate volumes- during operations – monthly;during post-closure after-care phase - every 6 months;

   b) Leachate composition - during operations – every 3 months; during post-closure after-care phase - every 6 months;

   c) Volume and composition of surface water - during operations – every 3 months; during post-closure after-care phase - every 6 months;

   d) Potential gas emissions and atmospheric pressure(CH_4, CO_2, O_2, H_2S, H_2, etc.) - during operations – monthly; during post-closure after-care phase - every 6 months.

2. Where the data analysis shows that the same effect can be achieved through measurements taken at longer intervals the Ministry shall be authorized to establish the frequency of measurements different from that specified in the Paragraph 1 of the Article, however leachate conductivity shall be monitored not less than once a year.
3. The monitoring of the volume and the composition of leachate shall be necessary only when the leachate collection is required. The frequency of leachate sampling is based on morphology of landfill and is determined in permit conditions. Leachate and surface water samples shall be taken at different locations. Leachate sampling and the determination of the leachate volume and composition shall be made separately for every location of the landfill where the leachate is managed independently. All samples shall be collected in accordance with the general guidelines on sampling methodology stipulated in ISO 5667-2 (1991).
4. Monitoring of surface water shall be conducted at least at two locations: in upper and down directions of landfill flows. Monitoring of surface water volume and the composition could be not necessary to implement if concrete waste body is not subject of important impact from landfill.
5. The gas monitoring shall be representative for every section or cell of the landfill where gas is generated. These measurements are associated mainly with the content of organic components in waste. At the operation stage CH_4, CO_2, O_2shall be monitored on a regular basis, while the frequency of monitoring of other gases shall depend on the content of landfilled waste and the effect of these gases on waste leachability.

Article 39 – Protection of groundwater and the landfill structure

1. The groundwater monitoring process shall be sufficient to provide all required information related to the groundwater that is likely to be affected by the landfill. Based on the results of hydrological surveys carried out during environmental permitting, a landfill operator shall select at least one monitoring location in the groundwater inflow region, and the second - in the outflow region.
2. Additional monitoring locations may be required depending on the nature of the landfill site (including possible receptor locations), the results of the hydrological assessment of the landfill site, and the need for early identification of accidental leachate releases into the groundwater.
3. Background sampling from all monitoring locations shall be carried out in at least three locations before the commencement of backfilling operations.
4. Sampling and analysis of leachate and groundwater is determined through the assessment for indicators of expected pollution that is necessary for early identification of underground water quality change. The parameters in taken samples shall be analyzed forthe expected composition of leachate and the quality of underground waters existing on the territory.
5. Groundwater level monitoring during operation and post-closure after-care period shall be carried outevery 6 months. If there are fluctuating groundwater levels, the frequency of monitoring shall be increased in accordance with permit conditions.
6. The frequency of monitoring of the composition of groundwater during operation and post-closure after-care phasedepends on landfill characteristics.
7. The composition of groundwater - when a trigger level is reached, verification of an issue shall be necessary by repeating the sampling process. When the exceedance level isconfirmed, all necessary actions as defined in the conclusion of ecological expertise and the control and monitoring plan shall be followed.
8. The monitoring for the structure and composition of landfill body during operation phase shall be carried out annually.
9. The monitoring for the structure and composition of landfill body incudes topographical and other data required for construction plan such as surface occupied by waste, volume and

composition of waste, methods of depositing, time and duration of depositing, calculation of the remaining capacity available at the landfill based on permitted design capacity.

10. The monitoring of subsidence of the landfill surface during operation and post-closure after-care phaseshall be carried out annually.

Section V. Landfill Closure and After-Care

Article 40- Closure and After-Care of Landfills

1. The process for full landfill closure or partial closure shall commence when one of the following occurs:
    a) The landfill has reached the design grades and limits stipulated in thelandfill designdefined in the landfill permit;
    b) The Ministry approves a request from the landfill operator to close the landfill or itsportion;
    c) A reasoned decision of the Ministry for closure of the landfill or its portion.
2. The landfill closure shall be carried out in accordance with the closure and after-care plan defined in the landfill permit;
3. A landfill or a portion of the landfill shall be considered as closed only after written confirmation and approval of the Ministryof the closure based on an onsite inspection and determination that all requirements of the landfill closure plan have been met.
4. The closure of the landfill shall not release the landfilloperator from the responsibilities derived from the Waste Management Code, this Technical Regulation, and the conditions established by the landfill permit.
5. A landfill closure planshall include detailed information concerning the post-closure after-activities:
    a) Description of the process for dismantling and removal of the constructed permanent facilities that are not related with the continuing protection of the environment during post-closure after-care of the landfill.
    b) Description of the process for sealing the surface of the landfill in accordance with the approved landfill design and landfill permit including requirements for installation of the surface sealing system and other design elements required to close the landfill.
6. After closure of the landfill, the landfill operator shall carry out post-closure after-care activities including, at a minimum, the maintenance of all required infrastructure including access control fencing and gates, maintenance and operation of leachate and gas management systems andthe monitoring and control systems for all environmental parameters stipulated in the approved closure plan and required by this Technical Regulation. These activities shall be performed by the landfill operatorfor the period set by Ministrytaking into account the potential risk created by the closed landfill to human health and the environment.
7. In case of pollution or harm to the environment identified during the implementation of the control and monitoring plan at the post-closure after-care stage, the landfill operator shall immediately notify the Ministry and ensure the implementation of necessary corrective actions recommended by the Ministry at its own expenses.

Section VI – Conditioning Plan

Article 41- Conditioning Plan

1. The operator of the existing landfill that has not been permitted in accordance with the Law of Georgia on Environmental Impact Permit shall agree a conditioning plan on bringing the landfill into compliance with the requirements specified in this Technical Regulation with the Ministry of Environment and Natural Resources Protection of Georgia.
2. The conditioning plan shall, at a minimum, contain the following information:
    a) Location of the landfill site and background information about the site history and landfill operator;
    b) Design of the landfill that will result from the implementation of the conditioning plan;
    c) Characteristics of the waste currently and historically received at the site, including waste codes specified in the List of Wastes approved by the Resolution of the Government of Georgia on Approval of the List and Categories of Wastes by their Type and Characteristics;
    d) Description of the area where the landfill is located, description of sensitive receptors: nearby populated areas, surface and groundwater bodies, drinking water sources and protected areas, description of leachate collection and treatment system;
    e) Information concerning the geological and hydrogeological characteristics of the landfill site;
    f) Proposed classification of the landfill;
    f) Description of current and proposed procedures and the criteria for waste acceptance at the landfill;
    g) Assessment of the harmful effect of landfill operation on the environment and human health;
    h) Estimate of the expected life of the landfill based on its available physical capacity and planned quantities of waste to be managed at the landfill;
    i) Description of the existing and proposed operational and maintenance procedures at the landfill as well as the means for monitoring and controlling environmental parameters and effects;
    j) Proposed description and phasing of conditioning measures;
    k) Measures envisaged for control and monitoring of the operation of the landfill after approval and implementation of the conditioning plan;
    l) Measures envisaged for the closure and the post-closure after-care of the landfill.
3. The existing landfill brought into compliance with this Technical Regulation shall be given the right to continue operation for a period approved by the Ministry and fall within the ambit of this Technical Regulation.
4. An existing landfill that does not pose a serious risk to human health but cannot be brought into compliance with the requirements of this Technical Regulation shall continue operation according to the submitted plan and terms established by the Ministry.

ANNEX

Part 1

PROCEDUREFOR WASTE ACCEPTANCE AT THELANDFILLS

1.1Basic Characterization

1.1.1 Basic characterization of the waste is the first step in the acceptance procedure and constitutes an initial full characterization of the waste by gathering all the necessary information for the safe disposal of the waste in the long-term. Basic characterization is required for each type of wasteexcluding exceptions stipulated in this Technical Regulation.

The basic characterization of the waste includes:

a) Information on the waste including: type, origin, composition, consistency, leachability behavior and any other features characterizing the waste.

b) Information for understanding the behavior of the subject waste in a landfill setting and for assessing the possibilities for treatment of the waste

c) Comparison of the waste leaching characteristics with the limit values for waste acceptance at the class of landfill for which the waste is evaluated.

d) Identification of key parameters to be utilized for compliance testing and options for simplification of compliance testing (with the purpose of decreasing the tested constituents for ongoing compliance testing after successful completion of the basic characterization process).The result of initial basic characterization may help determine the frequency for periodic compliance testing.

1.1.2 Information required for the basic characterization of a waste shall include the following:

a) Source and origin of the waste;

b) Information on the process producing the waste (description and characteristics of raw materials and products);

c) Description of the waste treatmentmethod applied in compliance with the Article 7 of this Technical Regulation, or a statement of reasons why such treatment is not considered necessary or may be impractical;

d) Data on the composition of the waste and its leaching behavior;

e) Physical appearance of the waste (smell, color, physical form, etc.)

g) Waste code in accordance with the List of Wastes approved by the Resolution of the Government of Georgia on Approval of the List and Categories of Wastes by their Type and Characteristics;

f) In case of hazardous waste – its characteristics according to the Annex III of Waste Management Code;

g) Information to prove that the waste does not fall under the waste prohibitions of the Paragraph 1 of the Article 6of this Technical Regulation;

h) The classification of the landfill at which the waste is proposed tobe accepted;

i) If necessary, additional precautions to be taken at the landfill;

j) Information on whether the waste can be recycled or recovered.

1.1.3 The waste shall be tested to obtain the information required inthe Paragraph 1.1.2 of this Annex. In addition to the leachingbehavior of the waste, the composition of the waste shall be known or determined through testing. The tests used for basic characterization shall always include those to be used for compliance testing.

The content of the characterization process, the extent of laboratory testing required and the relationship between basic characterization and periodic compliance testing depends on the type of waste. However, a differentiation shall be made between:

a) Waste that is regularly generated from the same process;

b) Waste that is not regularly generated.

Wastes regularly generated from the same process - individual and consistent waste forms that are regularly generated in the same process, where:

a) The installation and the process generating the waste and the input materials to the process are well known and well defined,

b) The operator of the facilitywhere the waste is generated provides all necessary information and informs the landfill operator of changes to the waste generating process (especially changes associatedwith process input materials that will affect resulting waste properties).

If the wastesare sourced from different installations and have similar characteristics, these wastes can be identified as a single stream with common characteristics within known production boundaries.

For the wastes regularly generated from the same process, the basic characterization will comprise the fundamentalrequirements listedin the Paragraph 1.1.2 of this Annex.

If the waste is produced through the same process in different installations, information shall be provided on the scope of the evaluation associated with each waste source. Consequently, a sufficient number of measurements shall be taken to show the range and variability of the characteristic properties of the waste from all generation locations. The waste can then be considered characterized and shall subsequently be subject to compliance testing only, unless changes in the generation processes occur at any of the waste source facilities that may affect waste properties.

For waste from the same process at the same installation, the results of the measurements may show only minor variations of the waste properties in comparison with the appropriate limit values. The waste can then be considered as characterized and shall subsequently be subject to compliance testing only unless significant changes in the generation process occurs that affect the waste characteristics.

Waste from facilities for bulking or mixing of waste, from waste transfer stations or mixed waste streams from commercial waste collectors can vary considerably in their properties. These wastes can be identified as wastes that are not regularly generated.

Wastes that are not regularly generated - these wastes are not regularly generated in the same process in the same installation and are not part of a well-characterized and consistent waste stream.

Each batch produced of such waste shall be characterizedon an individual basis for acceptance. The basic characterization shall include the fundamental requirements stipulated in the Paragraph 1.1.2 of this Annex. Since each waste batch produced has to be characterized, no compliance testing is needed.

1.1.4Cases where testing for basic characterization is not required:

a) The waste is on a list of wastes not requiring testing according to this Annex;

b) All the necessary information for basic characterization is known and duly justified to the full satisfaction of the Ministry;

c) Certain waste types where testing is impractical or where appropriate testing procedures and acceptance criteria are unavailable.

1.2Compliance Testing

When waste has been deemed acceptable for a landfill class on the basis of a basic characterization, it shall subsequently be subject to periodic compliance testing to determine if that the waste consistently complies with the results of the basic characterization and the relevant acceptance criteria. The function of compliance testing is to periodically check regularly received waste streams.

The relevant parameters to be tested during compliance testing shallbe determined during the basic characterization process. Parameters for compliance testing shallbe related to the basic characterization testing information. For compliance testing, only a periodic assessment of critical parameters (key variables), as determined from the basic characterization process and its results, is necessary. For continued acceptance of a recurring waste from the same source and derived from the same generating process, the compliance testing check has to show that the waste continues to meet the required limit values for the critical parameters.

The tests used for compliance testing shall be one or more of those used in the basic characterization process. At a minimum, the testing shall consist of a batch leaching test utilizing the methodology presented inthe Part3 of this Annex.

Compliance testing shall be carried out at least once each year for recurring waste streams. However, the landfill operator shall, in any event, ensure that compliance testing is carried out within the scope and frequency determined throughthe basic characterization process.

1.3 On-Site Verification

Each load of waste delivered to a landfill shall be visually inspected before and after unloading at the landfill active area.

For waste deposited by waste producers at a landfill in their control, this verification maybe made at the point of dispatch from the waste generation source.

The waste maybe accepted at a landfill, if it is the same as that which has been subjected to basic characterization and compliance testing and which is described in accompanying documents. If this is not the case, the waste shall not be accepted and a new basic characterization process may be required.

Upon waste delivery, representative samples shall be periodically taken. These samples shall be kept after acceptance of the waste for a period not less than three months after waste receipt.

Part 2

CRITERIA FOR WASTE ACCEPTANCE

Waste acceptance criteria

In certain circumstances (except dissolved organic carbon (DOC) in Paragraphs 2.1.2.1, 2.2.2, 2.3.1and 2.4.1, BTEX, PCBs and mineral oil in Paragraph2.1.2.2, TOCand Phin Paragraph 2.3.2, LOI and/orTOC 2.4.2,andTOClimit values in Paragraph 2.1.2.2,for which up to two times the higher limit values are acceptable) up to three times the higher limit values are acceptable if:

a) The Ministry issues a landfill permit for specific wastes on a case-by-case basis for a particular landfill since, in issuing the permit, the Ministry takes into account the characteristics and the state of the environment of the landfill site and its surroundings, and

b) When taking into account the limits for the specific parameters, emissions (including leachate) from the landfill will present no additional risk to the environment or human health in accordance with a risk assessment.

2.1Landfills for Inert Waste

2.1.1 Acceptance of waste without testing

Landfills classified for inert waste shall accept waste forms listed in Table 1and waste that meet the limit leaching values and the limit values for total content of organic parameters.

It is assumed that wastes presented in Table 1 fulfill the criteria stipulated in the definition of inert waste and meet the limit values for total content of organic parameters listed in Tables 2 and 3 of this Annex. The waste shall be a single stream of a single waste type from only one source. Other wastes may be accepted together with those listed in Table 1, provided that they are from the same source.

In the case of suspicion that inert waste is contaminated either through visual inspection or from knowledge of the origin of the waste, testing shall be required or the waste refused for disposal at the landfill.

If wastes are contaminated or contain other materials or substances such as metals, asbestos, plastics, chemicals, etc. to an extent that increases the risk associated with the waste sufficiently to justify their disposal in another class of landfills, the waste shall not be accepted in a landfill classified solely for inert waste.

Wastes that are not included in Table 1, are subject of testing for verifying inert waste landfill acceptance criteria according to the Part 1 of this Annex

Table 1

EWC Code[1]	Description	Restrictions
1011 03	Glass-based fibrous materials	Only without organic binders
1501 07	Glass packaging	
1701 01	Concrete	Only selected construction waste[2]
1701 02	Bricks	Only selected construction waste[2]
1701 03	Tiles and ceramics	Only selected construction waste[2]
1701 07	Mixtures of concrete, brick(s), tiles and ceramics	Only selected construction waste[2]
1702 02	Glass	
1705 04	Soils and stones	Only from garden and parks waste; excluding top soil, peat
1912 05	Glass	
2001 02	Glass	Separately collected glass only
2002 02	Soils and stones	Only from garden and park waste; excluding top soil, peat

Notes*:*

1. In accordance with the List of Wastes approved by the Resolution of the Government of Georgia on Approval of the List and Categories of Wastes by their Type and Characteristics;

2. Selected construction waste shall consist of waste with low content of other types of materials (such as metals, plastic, soil, organics, wood, rubber, etc.). The origin of the waste shall be known. Moreover, the waste shall not contain waste components that are:

- polluted with inorganic or organic dangerous substances due to production processes in the construction activities, soil pollution, storage and usage of pesticides or other dangerous substances;

- treated, covered or painted with materials containing dangerous substances in significant amounts.

2.1.2 Limit values

2.1.2.1 Leaching limit values

The leaching limit values for waste acceptable at landfills for inert waste are determined in accordance with the Part 3 of this Annex and calculated at liquid to solid ratios (L/S) of 2 l/kg and 10 l/kg for total release and directly expressed in mg/l for C_0 (the first eluate of a percolation test at L/S = 0.1 l/kg).

Table 2

Component	**L/S = 2 l/kg** mg/kg dry substance	**L/S = 10 l/kg** mg/kg dry substance	**C_0 (percolation test)** mg/l
As	0.1	0.5	0.06
Ba	7	20	4
Cd	0.03	0.04	0.02
Cr total	0.2	0.5	0.1
Cu	0.9	2	0.6
Hg	0.003	0.01	0.002
Mo	0.3	0.5	0.2
Ni	0.2	0.4	0.12
Pb	0.2	0.5	0.15
Sb	0.02	0.06	0.1
Se	0.06	0.1	0.04
Zn	2	4	1.2
Chloride	550	800	460
Fluoride	4	10	2.5
Sulfate	560(*)	1000[1]	1500
Phenol index	0,5	1	0,3
DOC (C)(**)	240	500	160
TDS (TS)(***)	2500	4000	—

Notes:

(*) If the waste does not meet these values for sulfate, it may still be considered as complying with the acceptance criteria if the leaching test results do not exceed either of the following values: 1500 mg/l as C_0 at L/S = 0.1 l/kg and 6000 mg/kg at L/S = 10 l/kg. It will be necessary to use a percolation test to determine the limit value at L/S = 0.1 l/kg under initial equilibrium conditions, whereas the value at L/S = 10 l/kg maybe determined either by a batch leaching test or by a percolation test under conditions approaching local equilibrium.

(**) If the waste does not meet these values for dissolved organic carbon (DOC) at its own pH value, it may alternatively be tested at L/S = 10 l/kg and at a pH between 7.5 and 8.0. The waste maybe considered as complying with the acceptance criteria for dissolved organic carbon (DOC) if the result of this alternative determination does not exceed 500 mg/kg.

(***) The values for total dissolved solids (TDS) can be used as alternatives to the values for sulfate and chloride.

2.1.2.2. Limit values for total content of organic parameters

Table 3

Parameter	Value Mg/kg
Total organic carbon - TOC	30000(*)
Benzene, toluene, ethylbenzene and xylenes - BTEX	6
Polychlorinated biphenyls, 7 congeners - PCBs	1
Mineral oil (C10 to C40)	500
Polycyclic aromatic hydrocarbons - PAHs	1000

Note:
(*) For soils, the Ministry can allow higher admissible values in the case when value of 500 mg/kg for DOC is achieved at L/S = 10 l/kg, by testing at the pH of the soil or by values of pH between 7.5 and 8.

2.2Landfills for Non-Hazardous Waste

2.2.1. Waste acceptance without testing

Municipal waste classified as non-hazardous waste according to the 20thgroup of wastes from the List of Wastes approved by the Resolution of the Government of Georgia on Approval of the List and Categories of Wastes by their Type and Characteristics,separately collected non-hazardous fractions of household wastes and other non-hazardous materials of different origincan be accepted without testing at landfills classified for non-hazardous waste.

The wastes shall not be acceptedif they are contaminated to an extent that increases associatedrisks sufficiently to justify their disposal in a landfill classified for receipt of other types of waste.

Municipal waste shall not be disposed in landfill cells where stable, non-reactive hazardous waste is landfilled.

2.2.2. Limit values

Table 4 establishes the limit values that apply to granular non-hazardous waste that may be accepted in the same cell as stable, non-reactive hazardous waste. These limit values are calculated at liquid to solids ratios of 2 and 10 l/kg for total release and directly expressed in mg/l for C_0 (in the first eluate of percolation test at L/S = 0.1 l/kg). Granular waste includes all wastes that are not monolithic (that is waste that has been deliberately treated to solidify it and strongly bind it).

The criteria for monolithic waste acceptance shall provide the same level of protection of the environment and human health as represented by the limit values shown in Table 4.

Table 4

Components	**L/S = 2 l/kg** mg/kg dry substance	**L/S = 10 l/kg** mg/kg dry substance	**C_0**(percolation test) mg/l
As	0.4	2	0.3
Ba	30	100	20
Cd	0.6	1	0.3
Cr total	4	10	2.5
Cu	25	50	30
Hg	0.05	0.2	0.03
Mo	5	10	3.5
Ni	5	10	3
Pb	5	10	3
Sb	0.2	0.7	0.15
Se	0.3	0.5	0.2
Zn	25	50	15
Chloride	10000	15000	8500
Fluoride	60	150	40
Sulfate	10000	20000	7000
DOC(*)	380	800	250
TDS (**)	40000	60000	-

Notes:

(*) If the waste does not meet thelimit values for dissolved organic carbon DOC at its existing pH value, it may alternatively be tested at L/S = 10 l/kg and a pH of 7.5 to 8.0. The waste maybe considered as complying with the acceptance criteria for DOC if the result of this alternative determination does not exceed 800 mg/kg.

(**) The values for total dissolved solids (TDS) can be used as an alternative to the values for sulfate and chloride for determining compliance with acceptance criteria.

2.2.3. Gypsum waste

Non-hazardous gypsum-based materials shall be disposed of only in landfills for non-hazardous waste in cells where no biodegradable waste is placed. The limit values for TOCand DOC stipulated in Paragraph 2.3.1. of this Annexshall apply to all wastes landfilled together with gypsum-based materials.

2.3Stable, non-reactive hazardous waste

Stable, non-reactive hazardous waste (e.g. solidified, vitrified) is that which demonstrates a leaching intensity equivalent to that of the non-hazardous waste acceptable at landfills for non-hazardous waste.Stable, non-reactive means that the leaching behavior of the waste will not change adversely in the long-term under conditions of a landfill or as a result of foreseeable incidents:

a) In the waste alone (for example, by biodegradation);

b) Under the impact of long-term ambient conditions (for example, water, air, temperature);

c) By the impact of contact with other wastes (including leachate and landfill gas).

2.3.1 Limit values

The leaching limit values shown in Table 5 apply to granular stable non-reactive hazardous waste that may be accepted at landfills for non-hazardous wasteand are calculated for liquid to solids ratios of 2 and 10 l/kg for total release and directly expressed in mg/l for C_0 (the first eluate of percolation test at L/S = 0.1 l/kg).

The criteria for monolithic waste shall provide the same level of protection of the environment and human health as represented by the limit values for granular waste shown in Table 5.

Any granular stable non-reactive hazardous waste can only be accepted if the waste is determined to have sufficient physical stability and bearing capacity to maintain the structural integrity of the landfill waste mass.

Hazardous monolithic wastes shall be evaluated with criteria that ensures that the hazardous monolithic wastes are stable and non-reactive before acceptance in landfills for non-hazardous waste.

Table 5

Components	**L/S = 2 l/kg** mg/kg dry substance	**L/S = 10 l/kg** mg/kg dry substance	**C_0**(percolation test) mg/l
As	0.4	2	0.3
Ba	30	100	20
Cd	0.6	1	0.3
Cr total	4	10	2.5
Cu	25	50	30
Hg	0.05	0.2	0.03
Mo	5	10	3.5
Ni	5	10	3
Pb	5	10	3
Sb	0.2	0.7	0.15
Se	0.3	0.5	0.2
Zn	25	50	15
Chloride	10000	15000	8500
Fluoride	60	150	40
Sulfate	10000	20000	7000
DOC[1]	380	800	250
TDS[2]	40000	60000	-

Notes:

1. If the waste does not meet theTable 5 values for DOC at its existing pH, it may alternatively be tested at L/S = 10 l/kg and a pH of 7.5 to 8.0. The waste maythen be considered as complying with acceptance criteria for DOC if the result of this alternative determination does not exceed 800 mg/kg
2. The values for TDS can be used alternatively to the values for sulfate and chloride for determining compliance with acceptance criteria.

2.3.2 In addition to the leaching limit values stated inTable 5, granular stable non-reactive hazardous wastes shall meet the following additional criteriaspecified in Table 6

Parameters	Values
Total Organic Carbon – TOC	5%[1]
pH	minimum 6
Acid Neutralization Capacity – ANC	Must be evaluated

Note:

1. If this value is not achieved, a higher limit value may be accepted by the Ministry provided that a DOC value of 800 mg/kg is achieved at L/S = 10 l/kg either at the waste's existing pH value or at a pH value ranging between 7.5 and 8.0.

2.3.3Asbestos waste

Asbestos and construction materials containing asbestos may be accepted at landfills for non-hazardous waste without testing.

For landfills receiving asbestos and construction materials containing asbestos,the following requirements shall be met:

a) The waste contains no other hazardous substances except for bound asbestos, including fibers bound by a binding agent or packed/contained in plastic;

b) The landfill accepts only asbestos and construction material containing asbestos. This waste may be landfilled in a separate cell within a landfill for non-hazardous waste if the cell is sufficiently self-contained and dedicated to the disposal of this material;

c) In order to avoid dispersion of asbestos fibers, the deposit location for the asbestos bearing material shall be covered daily and before each compaction operation with appropriate material and, if the waste is not packed or contained, it shall be regularly sprinkledwith water;

d) A final top cover is to be installedon the landfill/cell surface once the landfill is closed or a cell reaches its design limits in order to avoid the airborne dispersion of asbestos fibers;

e) No work is to be carried out on a landfill or cell locations where asbestos or asbestos containing material has been placed that could lead to a release of asbestos fibers (Excavations or the drilling of holes, for example);

f) After closure, a site mapshall be maintained by the landfill operator showing the location withina landfill and cell where asbestos wastes have been deposited;

g) Appropriate measures shallbe taken by the landfill operator to limit the possible use of landfill surfaces after landfill closure where asbestos or asbestos containing materials have been deposited in order to avoid human contact with the waste and the potential emission of asbestos fibers.

For landfills receiving only asbestos or construction material containing asbestos, the requirements stipulated in Articles 12 of this Technical Regulation can be reduced by the permit conditions if the requirements of the Paragraph 2.3.3 are met.

2.4Landfills for hazardous waste

2.4.1**Limit values**

The leaching limit values shown in Table 7 apply to the acceptance of granular hazardous waste at landfills classified for receipt of hazardous waste and are calculated at liquid to solids ratios of 2 and 10 l/kg for total release and directly expressed in mg/l for C_0 (in the first eluate of percolation test at L/S = 0.1 l/kg). Granular wastes include all wastes that are not monolithic.

The criteria utilized for monolithic wastes have to provide the same level of protection of the environment as the limit values for granular hazardous waste presented in Table 7.

Table 7

Components	**L/S = 2 l/kg** mg/kg dry substance	**L/S = 10 l/kg** mg/kg dry substance	**C_0**(percolation test) mg/l
As	6	25	3
Ba	100	300	60
Cd	3	5	1,7
Cr total	25	70	15
Cu	50	100	60
Hg	0,5	2	0,3
Mo	20	30	10
Ni	20	40	12
Pb	25	50	15
Sb	2	5	1
Se	4	7	3
Zn	90	200	60
Chloride	17,000	25,000	15,000
Fluoride	200	500	120
Sulfate	25,000	50,000	17,000
DOC[1]	480	1,000	320
TDS[2]	70,000	100,000	-

Notes:

1. If the waste does not meet the above limiting values for DOC at its existing pH, it may alternatively be tested at L/S = 10 l/kg and a pH of 7.5 to 8.0. The waste may then be considered as complying with the acceptance criteria for DOC if the result of this alternative determination does not exceed 1,000 mg/kg.
2. The values for TDS can be used as an alternative to the values for sulfate and chloride to determine compliance to acceptable criteria.

2.4.2 In addition to the leaching limit values granular hazardous wastes shall meet the additional criteria shown in Table 8:

Table 8

Parameters	**Value**
Losses - LOI[1]	10 %
Total Organic Carbon TOC[1]	6 %[2]
Acid Neutralization Capacity – ANC	Has to be calculated

Notes:

1. Either LOI or TOC shall be used to determine waste acceptance compliance.
2. If the value for TOC is not achieved through testing, a higher limit value may be accepted by the Ministryprovided that the DOC value of 1000 mg/kg is achieved at L/S = 10 l/kg, either at the waste's existing pH or at a pH value range between 7.5 and 8.0.

2.5Underground Storage

For the acceptance of waste in underground storage sites, a site-specific safety assessment as defined in Part 4 of this Annex shall be completed. Waste maybe accepted for underground storage only if the waste is compatible with the results of the site-specific safety assessment.

Only waste that fulfills the criteria stipulated inParagraph 2.1 this Annex may be accepted at underground storage sites for inert waste.

Only the waste that fulfills the criteria stipulated in Paragraphs 2.2 and 2.3 of this Annex may be acceptedat underground storage sites for non-hazardous waste.

Only the waste that is compatible with the results of the site-specific safety assessment may be accepted at underground storage sites for hazardous waste. In such cases, the criteria stipulated in Paragraph 2. 4 of this Annex do not apply. However, the waste shallbe subject to the acceptance procedure described in Part 1 of this Annex.

PART 3

SAMPLING AND TESTING

Sampling and testing for basic characterization and compliance testing shall be carried out by accredited laboratories. The following is also allowed:

a) The sampling may be carried out by producers of the waste or landfill operators under the condition that sufficient supervision byauthorized representatives of accredited bodies is providedto achieve the requirements of this Annex;

b) The testing of the waste maybe carried out by producers of the waste or landfill operators if they have establishedasystemto assure testing accuracy.

Sampling and testing for basic characterization and compliance testing shall be carried out in accordance with internationally agreedmethodology and procedures.

Part 4

SAFETY ASSESSMENT FOR UNDERGROUND STORAGE

4.1 Safety concept for underground storage of all types of waste

4.1.1**The importance of the geological barrier**

The insulation of wastes from the biosphere is the ultimate objective for the final disposal of wastes in an underground storage facility. Wastes, a geological barrier and cavities associated with the underground storage facility (including any engineered structures) shall constitute a system that collectively with all other technical aspects of the underground storage facility meet the requirements of this Annex.

The disposal of the waste by means of underground storage is allowed under condition that the long-term safety of the underground storage facility regarding groundwater quality is demonstrated in accordance with the requirements of the relevant legislation.

4.1.2 Site-specific risk assessment of underground storage

The assessment of risk to the environment and human health for an underground storage facility requires the identification of:

a) Potential hazards (in this case, the potential effects of the deposited wastes);

b) Receptors (in this case, the biosphere and groundwater);

c) The pathways by which substances from the waste within the underground storage facility may reach the biosphere; and

d) The assessment of the impact of substances that may reach the biosphere.

The acceptance criteria for waste to be placed in underground storage can be determined only through an assessment of local ambient conditions. This requires a clear demonstration of the suitability of the host strata for establishing the underground storage facility which requires an assessment of the specific risks associated with the potential containment. This demonstration shall take into account the overall interaction of the waste to be stored, engineered structures and cavities to be utilized and the host rock setting.

The site specific risk assessment of the underground storage installation shall be carried out for both the operational and post-operational phases of the proposed underground storage. From this assessment, the required control and safety measures and acceptance criteria can be determined.

An integrated performance assessment analysis shall be prepared that shall include the following components:

a) Geological assessment;

b) Geomechanical assessment;

c) Hydrogeological assessment;

d) Geochemical assessment;

e) Biosphere impact assessment;

f) Operational phase assessment;

g) Long-term assessment of the operation and post-operation phase;

h) Assessment of the environmental impact of all surface facilities associated with the underground storage.

4.1.2.1 Geological Assessment

A thorough investigation or knowledge of the geological setting of a proposed underground storage site is required. This includes investigations of the nature and characteristics of rocks, soils and the topography. The geological assessment shall clearly demonstrate the suitability of the proposed site for underground storage. The location, frequency and structure of any faulting or fracturing in surrounding geological strata and the potential impact of seismic activity on the underground storage structures shall be included in the geological assessment.

4.1.2.2 Geomechanical Assessment

The stability of the cavities to be utilized for underground storage shall be demonstrated by appropriate investigations and predictions. The effect of the waste proposed for placement in the underground storage facility shall be a component of this assessment. The above shall be analyzed and documented in a systematic way to clearly demonstrate that:

a) During and after the formation of the required underground storage cavities, no major deformation is expected either within the cavity itself or at the earth surface which could impair the operability of the underground storage or provide a pathway for the release of pollutants to the biosphere;

b) The load-bearing capacity of the cavity is sufficient to prevent its collapse during construction and operation;

c) The deposited waste shallhave the necessary stability that is compatible with the geo-mechanical properties of the host rock

4.1.2.3. Hydrogeological Assessment

An investigation of the hydrogeological properties is required to assess the groundwater flow pattern in the surrounding strata based on information related to the hydraulic conductivity of the rock mass, fractures and the hydraulic gradients associated with groundwater flow.

4.1.2.4. Geochemical Assessment

An investigation of the rock and groundwater composition is required to assess current groundwater composition and its potential evolution over time during the use of the underground storage facility, the nature and abundance of fracture filling minerals, as well as a quantitative mineralogical characterization of the host rock. The impact of variability on the geochemical system that may be due to the waste characteristics shall also be assessed.

4.1.2.5.Biosphere Impact Assessment

An investigation of the biosphere that could be impacted by the underground storage facility is required. Baseline studies shall be completed to define local natural background levels of relevant substances.

4.1.2.6 Risk Assessment of the Operational Phase

For the operational phase of the underground storage facility, the analysis shall demonstrate that:

a) The structural stability of the cavities as stipulated in Paragraph 4.1.2.2 of this Annexcan be met;

b) There is no unacceptable risk of a pathway developing between the stored waste and the biosphere;

c) There is no unacceptable risks affecting the operation of the facility.

When demonstrating operational safety, a systematic analysis of the operation of the underground storage facility shall be completed based on specific data concerning the proposed waste inventory, facility management and the proposed operation and maintenance activities. The assessment shall clearly demonstrate that the waste placed into the underground storage facility will not react with the containing rock in any chemical or physical manner which could impair the strength and tightness of the rock strata and endanger the structural integrity of the storage facility. For these reasons, in addition to wastes that are banned as stipulated in theParagraph 1 of the Article 6 of this Technical Regulation, wastes that are liable to cause spontaneous combustion (by themselves or in combination with other waste forms), gaseous products, volatile wastes, and wastes coming as unidentified mixtures shall not be accepted at the underground storage facility.

The assessment of the operational phase shall identify any potential situations or incidents that may lead to the development of a pathway between the waste and the biosphere. The different types of potential operational risks shall be summarized in specific categories and their potential effects evaluated. The assessment process shall clearly demonstrate that there are no unacceptable risks where the containment inherent to the storage facility can be breached. Contingency measures shall be identified and provided for any potential risks do not preclude the development of the facility.

4.1.2.7. Long-Term Impact and RiskAssessment of the Operation and Post-Operation Phases

The required risk assessment halls also include the long-term effects of the facility. It shall be ascertained that no pathways to the biosphere will be generated during the long-term post-operation period of the underground storage life cycle.

The barriers of the underground storage site (e.g. the waste quality, engineered structures, back filling and sealing of shafts and drillings), the performance of the host rock, the surrounding strata and the overburden shall be quantitatively assessed over the long-term and evaluated on the basis of site-specific data or sufficiently conservative assumptions for defining potential long-term effects. The geochemical and hydrogeological conditions such as groundwater flow, barrier efficiency, natural attenuation as well as the leaching characteristics of the deposited wastes shall be taken into consideration.

The long-term safety of any proposed underground storage shall be demonstrated by a safety assessment that includes a description of the initial status of the storage facility at a specified time (e.g. time of closure) followed by a scenario identifying and assessing any important potential changes that are expected to occur over geological time. The consequences of the release of potentially harmful substances from the underground storage facility shall be assessed for different scenarios that reflect the possible long-term evolution of the biosphere, geosphere and the underground storage facility itself.

Because of their limited life, containers and cavity linings shall not be taken into account when assessing the long-term risks of waste deposits.

4.1.2.8. Impact Assessment of Surface Facilities

Although the waste received at the site is destined for subsurface disposal, the waste shall be unloaded, tested and possibly stored on the surface before placement into the underground storage facility. Waste reception facilities shall be designed and operated in a manner that prevent harm to human health and the environment. The surface facilities shall meet the same requirements as any other waste reception facilities.

4.1.2.9. Assessment of Other Risks

In accordance with the specific conditions and situations at the proposed underground storage location, the assessment of other potential risks may be necessary. This shall, at a minimum, include the following:

a) For worker protection, waste materials shall be deposited only in an underground storage location that is securely separated from mining activities;

b) Waste shall not be accepted if it contains or could generate hazardous substances which may lead to unsafe conditions for workers, e.g., spread of pathogenic microbes.

4.2. Acceptance for Underground Storage

4.2.1 Excluded wastes

Based on a consideration of criteria presented inParagraphs 1.2.1.-1.2.8. of this Annex, the following wastes shallbe excluded from underground storage:

a) Wastes listed in the Paragraph 1 of the Article 6 of this Technical Regulation;

b) Wastes and their containers which might react with water or the host rock under the storage conditions and lead to a change in the volume, generation of auto-flammable or toxic or explosive substances or gases, or any other reactions which could endanger the operational safety and/or the structural integrity of the storage facility.

c) Wastes that are biodegradable;

a) Wastes that have a pungent smell;

b) Wastes that can generate a gas-air mixture which is toxic or explosive which can cause toxic gas emissions or concentrations, form concentrations when saturated within a container which are higher than 10 % of the concentration which corresponds to the lower explosive limit of the material;

d) Wastes with insufficient stability to correspond to the geo-mechanical conditions or constraints;

e) Wastes that are auto-flammable or subject to spontaneous combustion under the expected storage conditions, gaseous products, volatile wastes, wastes coming from collections in the form of unidentified mixtures;

f) Wastes that contain, or could generate pathogenic sources of communicable diseases in accordance with the Subparagraph c of the Paragraph 1 of the Article 6of this Technical Regulation.

Wastes which might interact with other waste types shall be identified and classified in compatibility groups. The different compatibility groups shall be physically separated in the underground storage facility

4.2.2. Lists of waste suitable for underground storage

Inert wastes, hazardous and non-hazardous wastes, except for wastes specified by Paragraph4.2.1 of this Annex may be suitable for underground storage in accordance with the classificationsstipulated in the Paragraph 1 of the Article 4 of this Technical Regulation.

4.2.3. Site-specific risk assessment

Acceptance of waste at any underground storage site shall be based on the results of site-specific risk assessment. The site-specific assessment for the waste that may be accepted at an underground storage outlined in Paragraph 4.1.2. of this Annex shall demonstrate that the level of isolation from the biosphere is acceptable and does not pose a serious risk to human health and environment. The criteria have to be fulfilled under storage conditions.

4.2.4.Acceptance conditions

Wastes can be deposited only in an underground storage securely separated from mining activities.

Wastes that might react with other waste forms shall be identified and classified into compatibility groups and the different compatibility groups shall be physically separated in the storage facility.

4.3.Deep storage in hard rock

Deep storage in hard rock is here defined as an underground storage at several hundred meters depth, where hard rock includes various igneous rocks, e.g. granite or gneiss, it may also include sedimentary rocks, e.g. limestone and sandstone.

4.3.1 Safety concept

A deep storage in hard rock is a feasible way to avoid burdening future generations with the responsibility of the wastes. It shall be constructed with no need for maintenance. The construction shallnot obstruct recovery of the wastes or the ability to undertake future corrective measures. It shall also be designed to ensure that negative environmental effects or liabilities resulting from the activities of present generations do not fall upon future generations.

In the safety concept of underground disposal of wastes, the main concept is insulation of the waste from the biosphere, as well as natural attenuation of any pollutants leaking from the waste. For certain types of hazardous substances and waste, a need has been identified to protect the society and the environment against sustained exposure over extended periods of time. An extended period of time implies several thousands of years. Such levels of protection can be achieved by deep storage in hard rock. A deep storage for waste in hard rock can be located either in a former mine, where the mining activities have come to an end, or in a new storage facility.

In the case of hard-rock storage, total containment is not possible. In this case, an underground storage needs to be constructed so that natural attenuation of the surrounding strata mediates the effect of pollutants to the extent that they have no irreversible negative effects on the environment. This means that the capacity of the near environment to attenuate and degrade pollutants will determine the acceptability of a release from such a facility.

The requirements of the Georgian rules and legislation regarding the preservation of the water quality can only be fulfilled by demonstrating the long-term safety of the underground storage in accordance with the Paragraph 4.1.2.7. of this Annex. The performance of a deep storage system shall be assessed in a holistic way, accounting for the coherent function of different components of the system. In a deep storage in hard rock, the storage shall reside below the groundwater table. The direct discharge of pollutants into groundwater is generally prohibited. Measures are required to prevent the deterioration of the status of all bodies of groundwater.

For a deep storage in the hard rock, this requirement is respected in that any discharges of hazardous substances from the storage will not reach the biosphere, including the upper parts of the groundwater system accessible for the biosphere, in amounts or concentrations that will cause adverse effects. Therefore, the water flow paths to and in the biosphere shall be evaluated. The impact of variability on the geohydraulic system shall be assessed.

Gas formation may occur in deep storage in hard rock due to long-term deterioration of waste, packaging and engineered structures. Therefore, this shall be considered in the design of a deep storage facility in hard rock.