

Environmental Protection Act
Loi sur la protection de l'environnement

ONTARIO REGULATION 232/98

LANDFILLING SITES

Consolidation Period: From October 31, 2011 to the e-Laws currency date.

Last amendment: O. Reg. 268/11.

This Regulation is made in English only.

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PART I GENERAL

Definitions

1. (1) In this Regulation,

“base side slope” means any portion of the base of the waste fill zone extending from ground surface downward at an angle steeper than one unit vertical to four units horizontal;

“buffer area” means that part of a landfilling site that is not waste fill area;

“contaminant attenuation zone” means a three-dimensional zone that,

(a) is located on land adjacent to a landfilling site,

(b) is in the subsurface or extends into the subsurface, and

(c) is used or is intended to be used for the attenuation of contaminants from the landfilling site to levels that will not have an unacceptable impact beyond the boundary of the zone;

“contaminating life span” means,

(a) in respect of a landfilling site, the period of time during which the site will produce contaminants at concentrations that could have an unacceptable impact if they were to be discharged from the site, and

(b) in respect of a landfilling site and a contaminant or group of contaminants, the period of time during which the site will produce the contaminant or a contaminant in the group at concentrations that could have an unacceptable impact if they were to be discharged from the site;

“maximum waste loading” means, for a landfilling site, the total waste disposal volume divided by the area of the waste fill area;

“primary leachate collection system” means the uppermost leachate collection system below the waste fill zone;

“primary liner” means the uppermost liner below the waste fill zone;

“secondary leachate collection system” means a leachate collection system located below the primary leachate collection system;

“secondary liner” means a liner located below the primary liner;

“service life” means the period of time during which a properly maintained engineered facility will function in accordance with the performance specifications for its design;

“unacceptable impact” means interference with existing or potential reasonable uses of,

(a) land,

(b) ground water in or under land, or

(c) surface water on land;

“waste fill area” means the area on the surface of a landfilling site beneath which or above which waste is disposed of by landfilling. O. Reg. 232/98, s. 1 (1); O. Reg. 216/08, s. 1 (1).

(2) The words and expressions defined in section 1 of Regulation 347 of the Revised Regulations of Ontario, 1990 (General — Waste Management) made under the Act, except for the definition of “Director”, have the same meanings in this Regulation. O. Reg. 216/08, s. 1 (2).

(3) Revoked: O. Reg. 216/08, s. 1 (3).

Application

2. (1) This Regulation applies to the following landfilling sites:

1. Every landfilling site that comes into existence on or after August 1, 1998 and that is intended at the time it comes into existence to have a total waste disposal volume of more than 40,000 cubic metres and to accept only municipal waste for disposal.

2. Every landfilling site for which an alteration, enlargement or extension is proposed on or after August 1, 1998 that involves an increase in the site’s total waste disposal volume, if the site is intended after the alteration, enlargement or extension to have a total waste disposal volume of more than 40,000 cubic metres and to accept only municipal waste for disposal. O. Reg. 232/98, s. 2 (1).

(2) Subsection (1) does not apply with respect to a landfilling site in respect of which an application for a certificate of approval has been received by the Director under Part V of the Act before August 1, 1998, unless the operator or owner of the landfilling site gives written notice to the Director that the operator or owner wants this Regulation to apply. O. Reg. 232/98, s. 2 (2).

(3) The notice under subsection (2) must be given before the earlier of the following dates:

1. The date the certificate of approval or provisional certificate of approval is issued.

2. January 1, 1999. O. Reg. 232/98, s. 2 (3).

(4) The standards, procedures and requirements set out in this Regulation do not apply to the extent that terms and conditions set out in an environmental compliance approval impose different standards, procedures or requirements. O. Reg. 232/98, s. 2 (4); O. Reg. 268/11, s. 1.

PART II OWNERSHIP

Landfilling Site

3. The holder of an environmental compliance approval to which a landfilling site is subject must own the entire site in fee simple, unless the site is on Crown land. O. Reg. 232/98, s. 3; O. Reg. 268/11, s. 2.

Contaminant Attenuation Zone

4. (1) If a contaminant attenuation zone is necessary for proper operation of a landfilling site, the holder of an environmental compliance approval to which the landfilling site is subject must own property rights respecting the contaminant attenuation zone, unless,

(a) the contaminant attenuation zone is on Crown land and the Crown has agreed in writing to the use of the land for that purpose; or

(b) the contaminant attenuation zone is on a public road and the road authority has agreed in writing to the use of the land for that purpose. O. Reg. 232/98, s. 4 (1); O. Reg. 268/11, s. 3 (1).

(2) The holder of the environmental compliance approval must continue to own the property rights for all of the contaminating life span of the site. O. Reg. 232/98, s. 4 (2); O. Reg. 268/11, s. 3 (2).

(3) The ownership of the property rights must include the right to,

(a) discharge contaminants from the landfilling site into the contaminant attenuation zone;

(b) enter into the contaminant attenuation zone and onto the surface above the contaminant attenuation zone for purposes of testing, monitoring, intercepting contaminants and carrying out remedial work;

(c) install, operate and maintain works, for the purposes mentioned in clause (b), in or above the contaminant attenuation zone, including on the surface above the contaminant attenuation zone; and

(d) prevent the owner of the land in which the contaminant attenuation zone is located from paving, erecting a structure or making any use of land above or in the vicinity of the contaminant attenuation zone that would interfere with the functioning of the contaminant attenuation zone or with the exercise of any of the rights mentioned in this subsection. O. Reg. 232/98, s. 4 (3).

Changes

5. The holder of an environmental compliance approval or the applicant for an environmental compliance approval to which a landfilling site is or will be subject shall notify the Director in writing within 30 days after any change in his, her or its identity or status or any change in ownership of the site or ownership of property rights in the contaminant attenuation zone. O. Reg. 232/98, s. 5; O. Reg. 268/11, s. 4.

PART III DESIGN

Design Specifications

6. (1) A person shall not establish a new landfilling site or increase the total waste disposal volume of an existing landfilling site unless a written report has been prepared in accordance with this section. O. Reg. 232/98, s. 6 (1).

(2) The report must describe the design of the landfilling site and must contain,

(a) a legal survey of the site;

(b) an up to date plan and description of the site and the area within 500 metres of the site that covers,

(i) all property and property boundaries,

(ii) all buildings, roads and utility corridors,

(iii) land contours, surface water drainage, water bodies, rights-of-way and other easements,

(iv) forested areas,

(v) land uses and land use designations, and

(vi) property conditions not otherwise covered in subclauses (i) to (v);

(c) detailed plans, specifications and descriptions for the design of the site, including,

(i) a plan and description of the waste fill area, base contours for waste disposal, base contours for any leachate collection system, top contours for waste disposal and top contours with final cover,

- (ii) the total waste disposal volume,
- (iii) a materials balance between the sources of soils, on or off the site, and the uses of soils on the site,
- (iv) a hydrogeological assessment of the suitability of the site for the landfilling of municipal waste that considers the geologic and hydrogeologic conditions of the site, the design of the site and the monitoring and contingency plans,
- (v) a geotechnical assessment of the suitability of the site for the landfilling of municipal waste that considers bearing capacity, differential settlement and slope stability during construction, operation and after closure, and that addresses the potential effects on any liner or leachate collection system,
- (vi) a description of the expected quality and quantity of leachate,
- (vii) detailed plans, specifications and descriptions of any liner system necessary to control leachate, including construction and quality assurance and quality control procedures for the liner materials and liner system installation,
- (viii) detailed plans, specifications and descriptions of any leachate collection, treatment and disposal system necessary to control leachate, including construction and quality assurance and quality control procedures for the system components and system installation,
- (ix) an assessment of the potential for subsurface migration of landfill gas at the site and of any control system necessary for monitoring or controlling the migration,
- (x) detailed plans, specifications and descriptions of any system necessary for controlling landfill gas by venting it or by collecting and burning or using it, including construction and quality assurance and quality control procedures for the system components and system installation,
- (xi) an assessment of the potential impacts on surface water features that may be caused by the site or operations at the site,
- (xii) detailed plans, specifications and descriptions of the system for collecting, directing and discharging surface water, including details of any sediment control or other features and including construction, quality assurance and quality control procedures for the system components and system installation,
- (xiii) detailed plans, specifications and descriptions of monitoring facilities for leachate, ground water, surface water and, where appropriate, landfill gas,
- (xiv) an assessment of potential noise impacts due to operations at the site and to local trucking related to operations at the site, including an evaluation of any proposed noise control measures,
- (xv) an assessment of potential visual impacts on nearby properties due to the site and site operations,
- (xvi) detailed plans, specifications and descriptions of the buffer area and ancillary facilities, including any screening, landscaping, fencing, weigh scales, buildings, structures, access roads, internal roads, holding areas for cover material, holding areas for rejected waste or materials for recycling, and other holding areas,
- (xvii) detailed plans, specifications and descriptions of the contaminant attenuation zone, if one is necessary,
- (xviii) an estimate of the contaminating life span of the site with respect to contaminants involved in the subsurface migration of landfill gas and an estimate of the service life of any engineered facilities associated with the subsurface migration of landfill gas,

(xix) an estimate of the contaminating life span of the site with respect to contaminants in leachate, unless a new landfilling site is being established and the design for the ground water protection features of the site meets the criteria set out in subsection 10 (4) or (5),

(xx) an estimate of the service life of every engineered facility associated with leachate, which may be specified as the service life provided for in Schedule 1, 2, 3 or 4 if the engineered facility meets the relevant conditions set out in that Schedule,

(xxi) details of any facilities intended to control or change the contaminating life span of the landfilling site,

(xxii) contingency plans that can be implemented to control and dispose of leachate produced in a quantity greater than expected or with a quality worse than expected, including specifications and descriptions in sufficient detail to demonstrate the feasibility of the plans,

(xxiii) contingency plans that can be implemented to control and dispose of landfill gas migrating in the subsurface in a quantity greater than expected or with a quality worse than expected, including specifications and descriptions in sufficient detail to demonstrate the feasibility of the plans,

(xxiv) a description of the source, nature and quality of daily cover, including, with respect to material not normally used for daily cover, a discussion of its benefits and limitations, a description of quality assurance and quality control procedures for daily cover and a description of application rates and application procedures for daily cover, including the frequency and timing of application of daily cover if other than at the end of each working day,

(xxv) a description of the nature, quality and quantity of final cover, including construction details and quality assurance and quality control procedures for the materials to be used and their installation,

(xxvi) a site closure plan, including details of the proposed end use of the site, the appearance of the site after closure, revegetation, landscaping, the construction of new facilities, and the removal of existing facilities to facilitate closure, post-closure care and site end use, and

(xxvii) a summary of the main characteristics of the landfilling site, including the maximum daily quantity of waste that will be accepted for disposal, the estimated annual average quantity of waste that will be accepted for disposal, the area of the landfilling site, the area of the waste fill area, the total waste disposal volume, the estimated waste disposal capacity in tonnes, any subcategories of municipal waste that are not expected to be received or that will not be accepted for disposal, and the estimated date of site closure. O. Reg. 232/98, s. 6 (2).

Buffer Area

7. (1) The owner and the operator of a landfilling site shall ensure that the waste fill area is completely surrounded by buffer area in accordance with this section. O. Reg. 232/98, s. 7 (1).

(2) The buffer area shall be at least 100 metres wide at every point. O. Reg. 232/98, s. 7 (2).

(3) Subsection (2) does not apply to a buffer area if the buffer area is at least 30 metres wide at every point and a written report confirms that,

(a) the buffer area provides adequate space for vehicle entry, exit, turning, access to all areas of the site and parking;

(b) the buffer area provides adequate space on the surface of the site for all anticipated structures, equipment and activities; and

(c) the buffer area is sufficient to ensure that potential effects of the landfilling operation do not have any unacceptable impact outside the site. O. Reg. 232/98, s. 7 (3).

(4) For the purpose of clause (3) (c), potential effects include surface runoff, litter, vectors, vermin, leachate, subsurface migration of landfill gas and aesthetic effects. O. Reg. 232/98, s. 7 (4).

Hydrogeological Assessment

8. (1) A person shall not establish a new landfilling site or increase the total waste disposal volume of an existing landfilling site unless a written report on the geologic and hydrogeologic conditions of the site and ground water protection for the site has been prepared in accordance with this section. O. Reg. 232/98, s. 8 (1).

(2) The report must contain,

(a) plans, specifications and descriptions of the geologic and hydrogeologic conditions of the site and the area in which the site is located; and

(b) an assessment of the suitability of the site for the landfilling of municipal waste, taking into account,

(i) the design of the site, including existing features and features that will be implemented to control the expected production of leachate and the expected subsurface migration of landfill gas,

(ii) regional and site specific geologic and hydrogeologic conditions,

(iii) the ability to identify future impacts on the ground water by monitoring,

(iv) the feasibility of contingency plans that can be implemented to control leachate produced in a quantity greater than expected or with a quality worse than expected, and

(v) the feasibility of contingency plans that can be implemented to control landfill gas migrating in the subsurface in a quantity greater than expected or with a quality worse than expected. O. Reg. 232/98, s. 8 (2).

Surface Water Assessment

9. (1) A person shall not establish a new landfilling site or increase the total waste disposal volume of an existing landfilling site unless a written report on the surface water conditions of the site and surface water protection for the site has been prepared in accordance with this section. O. Reg. 232/98, s. 9 (1).

(2) The report must contain,

(a) plans, specifications and descriptions of the surface water features on the site, the surface water features that will receive a direct discharge from the site and the surface water features of the area in which the site is located; and

(b) an assessment of the suitability of the site for the landfilling of municipal waste, taking into account,

(i) the design of the site, including existing features and features that will be implemented to control the expected production of leachate, the flow of surface water, and erosion and sedimentation resulting from the flow of surface water,

(ii) the surface water features on the site, the surface water features that will receive a direct discharge from the site and the surface water features of the area in which the site is located,

(iii) the ability to identify future impacts on the surface water features by monitoring, and

(iv) the feasibility of contingency plans that can be implemented to control surface water impacts resulting from the production of leachate in a quantity greater than expected or with a quality worse than expected. O. Reg. 232/98, s. 9 (2).

Ground Water Protection

10. (1) A person shall not establish a new landfilling site or increase the total waste disposal volume of an existing landfilling site unless a written report describing the design for the ground water protection features of the site has been prepared in accordance with this section. O. Reg. 232/98, s. 10 (1).

(2) The design for the ground water protection features of the site must,

(a) if a new landfilling site is being established, meet the criteria set out in subsection (3), (4) or (5); or

(b) if the total waste disposal volume of an existing landfilling site is being increased, meet the criteria set out in subsection (3). O. Reg. 232/98, s. 10 (2).

(3) The design for the ground water protection features of a landfilling site complies with subsection (2) if it meets the following criteria:

1. The objective of the design must be that the site will not cause the concentration of any contaminant listed in Column 1 of Table 1 to exceed the maximum allowable concentration for the contaminant in the ground water at any point on any adjacent property.

2. For the purpose of paragraph 1, the maximum allowable concentration for a contaminant shall be determined in accordance with the following formula:

where,

C_m is the maximum allowable concentration for the contaminant,

C_b is the background concentration of the contaminant in the ground water of the receptor aquifer,

C_r is the health related drinking water objective for the contaminant or the aesthetic drinking water objective for the contaminant, whichever is applicable, as set out in Column 5 or 6 of Table 1, and

X is,

(a) 0.25, if C_r is a health related drinking water objective, or

(b) 0.50, if C_r is an aesthetic drinking water objective.

3. The initial source concentration, mass as a proportion of total (wet) mass and half-life in leachate set out in Columns 2, 3 and 4 of Table 1 must be used for the purposes of evaluating the design with respect to the objective set out in paragraph 1.

4. The design must consider both advective and diffusive contaminant transport and must include examination of the effect of the failure of any engineered facilities when their service lives are reached.

5. A service life set out in Schedule 1, 2, 3 or 4 for an engineered facility may be used for the purpose of evaluating the design with respect to the objective set out in paragraph 1 if the relevant conditions set out in that Schedule are met.

6. Despite paragraphs 1, 2 and 3, if it is appropriate because of the nature of the waste or because the reasonable use of the ground water on the adjacent property is other than for drinking water, the Director may,

i. for the purpose of evaluating the design with respect to the objective set out in paragraph 1,

A. require or permit the use of values specified by the Director for Cr and X in the formula set out in paragraph 2, instead of the values set out in that paragraph, and

B. require or permit the use of an initial source concentration, mass as a proportion of total (wet) mass or half-life in leachate specified by the Director instead of the initial source concentration, mass as a proportion of total (wet) mass or half-life in leachate set out in Column 2, 3 or 4 of Table 1, or

ii. require or permit the objective of the design to be based in whole or in part on contaminants other than those listed in Column 1 of Table 1 and, for the purpose of evaluating the design with respect to that objective,

A. require or permit the use of values specified by the Director with respect to each of the other contaminants for Cr and X in the formula set out in paragraph 2, and

B. require or permit the use of an initial source concentration, mass as a proportion of total (wet) mass or half-life in leachate specified by the Director with respect to each of the other contaminants. O. Reg. 232/98, s. 10 (3).

(4) The design for the ground water protection features of a new landfilling site that is being established complies with clause (2) (a) if it meets the following criteria:

1. The maximum waste loading for any given background concentration of chloride in the ground water of the receptor aquifer must not be more than the value set out for that concentration in Column 1 of Table 2.

2. The infiltration rate through the final cover of the landfilling site must be greater than or equal to 0.15 metres per year.

3. There must be, at the base of the waste fill zone, a natural or engineered layer of soil in which attenuation of contaminants from the wastes in the site may take place and that meets the following conditions:

i. The layer must be at least three metres thick.

ii. The layer must consist of material that is relatively homogeneous.

iii. The layer must have a hydraulic conductivity less than or equal to 1×10^{-7} metres per second.

4. The waste fill zone must have a ground water protection system above the attenuation layer referred to in paragraph 3 and below the waste consisting of, from bottom to top,

i. a primary liner consisting of,

A. a clayey liner at least 0.75 metres thick that meets the conditions set out in Schedule 4 for an unlimited service life, has a hydraulic conductivity of not more than 1×10^{-9} metres per second, and has an organic carbon content of at least 0.1 per cent, and

B. a high density polyethylene (HDPE) geomembrane liner at least 1.5 millimetres thick that meets the conditions set out in Schedule 3 for a 150-year service life, and

ii. a primary leachate collection system that meets the conditions set out in Schedule 1 for a 100-year service life. O. Reg. 232/98, s. 10 (4).

(5) The design for the ground water protection features of a new landfilling site that is being established complies with clause (2) (a) if it meets the following criteria:

1. The maximum waste loading for any given background concentration of chloride in the ground water of the receptor aquifer must not be more than the value set out for that concentration in Column 2 of Table 2.

2. The infiltration rate through the final cover of the landfilling site must be greater than or equal to 0.15 metres per year.

3. There must be, at the base of the waste fill zone, a natural or engineered layer of soil in which attenuation of contaminants from the wastes in the site may take place and that meets the following conditions:

i. The layer must be at least one metre thick.

ii. The layer must consist of material that is relatively homogeneous.

iii. The layer must have a hydraulic conductivity less than or equal to 1×10^{-7} metres per second.

4. The waste fill zone must have a ground water protection system above the attenuation layer referred to in paragraph 3 and below the waste consisting of, from bottom to top,

i. a secondary liner consisting of,

A. a clayey liner at least 0.75 metres thick that meets the conditions set out in Schedule 4 for an unlimited service life, has a hydraulic conductivity of not more than 1×10^{-9} metres per second, and has an organic carbon content of at least 0.1 per cent, and

B. a high density polyethylene (HDPE) geomembrane liner at least 2.0 millimetres thick that meets the conditions set out in Schedule 3 for a 350-year service life,

ii. a secondary leachate collection system that meets the conditions set out in Schedule 2 for a 1,000-year service life,

iii. a primary liner consisting of,

A. a clayey liner at least 0.75 metres thick that meets the conditions set out in Schedule 4 for an unlimited service life, has a hydraulic conductivity of not more than 1×10^{-9} metres per second, and has an organic carbon content of at least 0.1 per cent, and

B. a high density polyethylene (HDPE) geomembrane liner at least 1.5 millimetres thick that meets the conditions set out in Schedule 3 for a 150-year service life, and

iv. a primary leachate collection system that meets the conditions set out in Schedule 1 for a 60-year service life. O. Reg. 232/98, s. 10 (5).

(6) For the purpose of this section, the background concentration of a contaminant in the ground water of the receptor aquifer is the median value for that contaminant based on all ground water samples taken from the receptor aquifer in accordance with the following rules:

1. At least five samples must be taken.

2. The samples must be taken at or near the site boundary where the potential impact is being examined.

3. The samples must not be taken from locations known to be or likely to be contaminated by human activity. O. Reg. 232/98, s. 10.

Leachate Disposal

11. A person shall not establish a new landfilling site or increase the total waste disposal volume of an existing landfilling site unless a written report containing plans, specifications and descriptions for the management and disposal of any leachate collected at the site has been prepared. O. Reg. 232/98, s. 11.

Leachate Contingency Plans

12. (1) A person shall not establish a new landfilling site or increase the total waste disposal volume of an existing landfilling site unless a written report containing plans, specifications and descriptions for a leachate contingency plan for the site has been prepared in accordance with this section. O. Reg. 232/98, s. 12 (1).

(2) The report must contain the following:

1. A description of the contingency measures, including the collection of leachate that would be carried out, if necessary, if a liner or leachate collection system fails or if leachate otherwise leaves the waste fill zone in a quantity greater than expected or with a quality worse than expected.
2. A statement of the maximum allowable concentrations for contaminants in the ground water at any point on any adjacent property and in any surface water feature on the site.
3. A description of the ground water monitoring stations to be used to identify potential increases in contaminant concentrations in the ground water beneath the site and predict potential increases at the property boundary and in any surface water feature on the site before any increases occur.
4. A discussion of the basis on which the monitoring stations referred to in paragraph 3 will be brought into service, indicating that stations near the waste fill area will be brought into service not later than the date that placement of the waste begins.
5. A description of the trigger criteria for initiating investigative activities into the cause of an increase in contaminant concentrations in ground water and in any surface water feature on the site, indicating that the criteria relate to the magnitude of the increase in contaminant concentrations or the magnitude of the rate of increase in contaminant concentrations. O. Reg. 232/98, s. 12 (2).

Surface Water Control

13. (1) A person shall not establish a new landfilling site or increase the total waste disposal volume of an existing landfilling site unless a written report containing plans, specifications and descriptions for the control, treatment and discharge of surface water at the site during construction, site operation and following closure has been prepared in accordance with this section. O. Reg. 232/98, s. 13 (1).

(2) The plans, specifications and descriptions must ensure that,

(a) the concentration of any contaminant in surface water being discharged from the site to a waterbody is in accordance with Ministry of Environment and Energy Guideline B - 1, Water Management, dated July 1994, and Ministry of Environment and Energy Procedure B - 1 - 1, Water Management, dated July 1994, as they may be amended from time to time; and

(b) the background levels for dissolved oxygen, turbidity, and temperature, and the hydrologic cycle of any on-site, adjacent or receiving surface water features, are not adversely affected by the site. O. Reg. 232/98, s. 13 (2).

Subsurface Migration of Landfill Gas

14. (1) A person shall not establish a new landfilling site or increase the total waste disposal volume of an existing landfilling site unless a written report has been prepared in accordance with this section that contains the following:

1. An assessment of the potential for the migration of landfill gas in the subsurface.

2. Plans, specifications and descriptions for the monitoring, control, collection, use or discharge of landfill gas at the site if, on the basis of the assessment, any of these actions are necessary. O. Reg. 232/98, s. 14 (1).

(2) The design of the site and any plans, specifications and descriptions for the control of landfill gas must ensure that the subsurface migration of landfill gas meets the following conditions:

1. The concentration of methane gas below the surface of the land at the boundary of the site must be less than 2.5 per cent by volume.

2. The concentration of methane gas must be less than 1.0 per cent by volume in any on-site building or enclosed structure, and in the area immediately outside the foundation or basement floor of the building or structure, if the building or structure is accessible to any person or contains electrical equipment or a potential source of ignition.

3. Paragraph 2 does not apply to a leachate collection, storage or treatment facility or landfill gas collection or treatment facility for which specific health and safety measures and procedures are in place relating to the risk of asphyxiation and the risk of explosion.

4. The concentration of methane gas from the site must be less than 0.05 per cent by volume in any off-site building or enclosed structure, and in the area immediately outside the foundation or basement floor of the building or structure, if the building or structure is accessible to any person or contains electrical equipment or a potential source of ignition. O. Reg. 232/98, s. 14 (2).

Atmospheric Emissions of Landfill Gas

15. (1) A person shall not establish a new landfilling site or increase the total waste disposal volume of an existing landfilling site unless a written report has been prepared respecting the design, operation, maintenance and monitoring of facilities for the collection, and for the burning or use, of landfill gas generated by the site during site operation and following site closure. O. Reg. 232/98, s. 15 (1); O. Reg. 216/08, s. 2 (1).

(2) Subsection (1) applies only if a new landfilling site is being established with a total waste disposal volume of more than 1.5 million cubic metres or the total waste disposal volume of an existing landfilling site is being increased to more than 1.5 million cubic metres. O. Reg. 232/98, s. 15 (2); O. Reg. 216/08, s. 2 (2).

(3) Subsection (1) does not apply to a landfilling site if a written report is prepared showing that the nature and quantity of landfill gas generated at the site is not likely to be of significant concern to the Director, based on the following factors:

1. The characteristics of the site.

2. The type of waste to be deposited.

3. The rate at which waste is deposited at the site. O. Reg. 216/08, s. 2 (3).

(3.1) Subsection (1) does not apply to a landfilling site if the only waste to be landfilled at the site is coal ash. O. Reg. 216/08, s. 2 (3).

(4) Subsection (1) does not apply to a landfilling site associated with forest products operations, such as the operations of a lumber mill, sawmill, pulp mill or similar facility, if the waste to be deposited at the site is produced by the forest products operations and is predominantly solid, non-hazardous process waste, such as woodwaste, effluent treatment solids, hog fired boiler ash, recycling process rejects, lime mud, grits or dregs. O. Reg. 232/98, s. 15 (4).

Operation and Maintenance Procedures

16. A person shall not establish a new landfilling site or increase the total waste disposal volume of an existing landfilling site unless a written report has been prepared containing plans, specifications and descriptions of the operation, maintenance, monitoring, closure and post-closure care of the site, including matters related to record keeping, reporting and financial assurance. O. Reg. 232/98, s. 16.

PART IV

FINANCIAL ASSURANCE

Contingency Plans

17. (1) The owner and the operator of a landfilling site shall ensure that financial assurance is provided for the contingency plans for the site, including the construction, operation, maintenance and replacement of works required by the contingency plans. O. Reg. 232/98, s. 17 (1).

(2) The financial assurance shall be provided in the form of a cash deposit paid to the Director or in such other form, such as a bond, a letter of credit or negotiable securities, as is acceptable to the Director. O. Reg. 232/98, s. 17 (2).

(3) Subject to subsection (4), the amount of the financial assurance shall be determined in accordance with the following formula:

where,

F = the amount of the financial assurance,

W = the number of tonnes of waste that have been deposited in the landfilling site at the time the amount of financial assurance is calculated,

I1 = the 1997 Annual Average Non-residential Building Construction Price Index for Toronto, determined with reference to the same base year as is applicable to I2, as published by Statistics Canada under the authority of the Statistics Act (Canada),

I2 = the most recent Annual Average Non-residential Building Construction Price Index for Toronto available at the time the amount of the financial assurance is calculated, as published by Statistics Canada under the authority of the Statistics Act (Canada).

O. Reg. 232/98, s. 17 (3).

(4) The amount of financial assurance provided shall be updated annually or as otherwise required by the Director. O. Reg. 232/98, s. 17 (4).

(5) The financial assurance shall remain in place until a written report is prepared that shows that the financial assurance is no longer required. O. Reg. 232/98, s. 17 (5).

(6) The financial assurance may be used by the Director to pay for expenses related to any planned or unplanned closure of the site or to the post-closure care of the site, if the owner fails, on the request of the Director, to perform the work or cover the expenses. O. Reg. 232/98, s. 17 (6).

(7) The owner and the operator of a landfilling site shall ensure that any amount of financial assurance used by the Director under subsection (6) is replaced within six months after it is used unless the Director directs otherwise. O. Reg. 232/98, s. 17 (7).

(8) Subsection (1) does not apply to require site specific financial assurance if financial assurance for the contingency plans is provided by a group financial assurance plan acceptable to the Director. O. Reg. 232/98, s. 17 (8).

(9) Subsection (1) does not apply in respect of a landfilling site owned by a municipality or the Crown. O. Reg. 232/98, s. 17 (9).

(10) Subsection (1) does not apply to a landfilling site owned by a forest products company if the waste to be deposited at the site is produced by forest products operations, such as the operations of a lumber mill, sawmill, pulp mill or similar facility, and is predominantly solid, non-hazardous process waste, such as woodwaste, effluent treatment solids, hog fired boiler ash, recycling process rejects, lime mud, grits or dregs. O. Reg. 232/98, s. 17 (10).

Closure and Post-Closure Care

18. (1) The owner and the operator of a landfilling site shall ensure that financial assurance for the closure of the site and the post-closure care of the site is provided in accordance with this section. O. Reg. 232/98, s. 18 (1).

(2) The financial assurance shall be provided in the form of a cash deposit paid to the Director or in such other form, such as a bond, a letter of credit or negotiable securities, as is acceptable to the Director. O. Reg. 232/98, s. 18 (2).

(3) The amount of the financial assurance shall be the present value at the estimated date of closure, in dollars current at that date, of an amount sufficient to cover the estimated costs for,

(a) the planned closure of the largest area that will require final cover at any one time during the operation of the site, including the costs of final cover and landscaping;

(b) care and maintenance of the final cover and landscaping for the contaminating life span of the site; and

(c) all other expected post-closure care activities for the contaminating life span of the site, including monitoring, analysis and reporting, the design, construction, operation, maintenance and replacement of engineered facilities and the disposal of wastes from the facilities, but not including any additional activities in the contingency plans for the site. O. Reg. 232/98, s. 18 (3).

(4) Any determination of the amount of the financial assurance shall be carried out in a manner consistent with Ministry of Environment and Energy Guideline F - 15, Financial Assurance, dated April 1994, and Ministry of Environment and Energy Procedure F - 15 - 1, Procedures for Financial Assurance, dated April 1994, as they may be amended from time to time. O. Reg. 232/98, s. 18 (4).

(5) Clause (3) (a) does not apply if part of the site is closed not less often than every five years. O. Reg. 232/98, s. 18 (5).

(6) If costs are estimated under subsection (3) for any matter related to leachate from the site, the contaminating life span of the site may not be estimated at less than 25 years from the date waste is last deposited at the site. O. Reg. 232/98, s. 18 (6).

(7) The financial assurance may be provided in stages as long as the amount that has been provided is always greater than the minimum amount determined in accordance with the following formula:

where,

A = the minimum amount of financial assurance that must have been provided,

B = the total amount of the financial assurance, as estimated under subsection (3),

C = the amount of waste that has already been deposited at the site,

D = the total amount of waste that will be deposited at the site.

O. Reg. 232/98, s. 18 (7).

(8) The estimation of costs and the amount of the financial assurance provided shall be updated annually or as otherwise required by the Director. O. Reg. 232/98, s. 18 (8).

(9) The financial assurance shall remain in place until a written report is prepared that shows that the financial assurance is no longer required. O. Reg. 232/98, s. 18 (9).

(10) The financial assurance may be used by the Director to pay for expenses related to any planned or unplanned closure of the site if the owner fails, on the request of the Director, to perform the work or cover the expenses. O. Reg. 232/98, s. 18 (10).

(11) The owner and the operator of a landfilling site shall ensure that any amount of the financial assurance used by the Director under subsection (10) is replaced within six months after it is used unless the Director directs otherwise. O. Reg. 232/98, s. 18 (11).

(12) Subsection (1) does not apply in respect of a landfilling site owned by a municipality or the Crown. O. Reg. 232/98, s. 18. O. Reg. 232/98, s. 18 (12).

PART V OPERATIONS

Site Preparation Report

19. A person shall not place any waste in a newly constructed base or base side slope area of a landfilling site until a written report has been prepared documenting all construction, quality assurance and quality control activities and confirming that the site conditions and details of the construction of the new area are in accordance with the design plans and specifications of the landfilling site. O. Reg. 232/98, s. 19.

Record Keeping

20. The owner and the operator of a landfilling site shall ensure that daily records of site operations are made during the operation of the site and that the records are retained for at least two years after they are made. O. Reg. 232/98, s. 20.

Annual Operations Report

21. The owner and the operator of a landfilling site shall ensure that,

(a) within three months after each anniversary of the date on which waste was first accepted at the site, an annual report is prepared respecting the operation of the landfilling site, including a summary of results from monitoring programs; and

(b) all of the reports are retained until at least two years after the site is closed. O. Reg. 232/98, s. 21.

Burning

22. (1) The owner and the operator of a landfilling site shall ensure that no municipal waste is burned at the site as part of the landfilling operation. O. Reg. 232/98, s. 22 (1).

(2) Subsection (1) does not apply to clean wood and brush that is burned during daylight hours under controlled and supervised conditions in a segregated portion of the site. O. Reg. 232/98, s. 22 (2).

Scavenging

23. The owner and the operator of a landfilling site shall ensure that there is no scavenging at the site. O. Reg. 232/98, s. 23.

Surface Water Monitoring

24. The owner and the operator of a landfilling site shall ensure that a program is carried out for monitoring the quality and quantity of the surface water features on the site and of the surface water features that receive a direct discharge from the site. O. Reg. 232/98, s. 24.

Ground Water Monitoring

25. The owner and the operator of a landfilling site shall ensure that a program is carried out for monitoring ground water quality and quantity. O. Reg. 232/98, s. 25.

Leachate Monitoring

26. The owner and the operator of a landfilling site shall ensure that a program is carried out for monitoring leachate quality and quantity. O. Reg. 232/98, s. 26.

Leachate Contingencies

27. (1) The owner and the operator of the landfilling site shall ensure that investigative activities are carried out with respect to the cause of an increase in contaminant concentrations if any of the trigger criteria described under paragraph 5 of subsection 12 (2), as they may have been modified under paragraph 2 of subsection (3) of this section, is exceeded for any single monitoring event. O. Reg. 232/98, s. 27 (1).

(2) The owner and the operator of the landfilling site shall ensure that the steps described in subsection (3) are taken if the investigative activities required by subsection (1) indicate that,

(a) the potential exists for a liner or leachate collection system to fail or for leachate to otherwise leave the waste fill zone in a quantity greater than expected or with a quality worse than expected;

(b) the potential exists to exceed any maximum allowable contaminant concentration described under paragraph 2 of subsection 12 (2);

(c) an expected contaminant level predicted by studies and modelling previously carried out under paragraph 4 of subsection (3) has been exceeded; or

(d) the highest previous observation of the background concentration of a contaminant in the ground water of the receptor aquifer has been exceeded, if studies and modelling have not previously been carried out under paragraph 4 of subsection (3). O. Reg. 232/98, s. 27 (2).

(3) The steps referred to in subsection (2) are the following:

1. Previously identified contingency measures must be reviewed and any necessary or desirable modifications made.
2. Previously identified trigger criteria must be reviewed and any necessary or desirable modifications made.
3. The monitoring programs for ground water, surface water and leachate must be reviewed and any necessary or desirable modifications made.
4. If they have not previously been carried out, studies and modelling that meet the following conditions must be carried out:
 - i. The studies and modelling must provide predictions of expected contaminant concentrations at least annually for the contaminating life span of the site.
 - ii. The studies and modelling must include predictions related to potential increases in contaminant concentrations in the ground water at the property boundary and in any surface water feature on the site, as well as at any ground water monitoring stations.
5. If studies and modelling described in paragraph 4 have previously been carried out, they must be reviewed and any necessary or desirable modifications made.
6. Implementation criteria for implementation of the contingency measures must be identified and the related activities and timing must be described. O. Reg. 232/98, s. 27 (3).

(4) If the monitoring results, investigative activities and implementation criteria indicate the need to implement contingency measures, the owner and the operator of a landfilling site shall ensure that the following steps are taken:

1. The Director must be notified of the need to implement contingency measures.
2. Detailed plans, specifications and descriptions for the design, operation and maintenance of the contingency measures must be prepared.
3. The contingency measures must be implemented. O. Reg. 232/98, s. 27 (4).

Daily Cover

28. (1) The owner and the operator of a landfilling site shall ensure that all waste accepted for disposal at the site is disposed of in the waste fill zone and is covered at the end of each working day by daily cover in accordance with this section. O. Reg. 232/98, s. 28 (1).

(2) The daily cover shall consist of soil, foundry sand, wood chips, compost or other material. O. Reg. 232/98, s. 28 (2).

(3) When tested using the Toxicity Characteristic Leaching Procedure, the daily cover must not produce leachate containing any of the contaminants listed in Schedule 4 to Regulation 347 of the Revised Regulations of Ontario, 1990 (General — Waste Management) made under the Act at a concentration equal to or in excess of the concentration specified in that Schedule for the contaminant. O. Reg. 216/08, s. 3.

(4) Subsection (1) does not apply to a landfilling site associated with forest products operations, such as the operations of a lumber mill, sawmill, pulp mill or similar facility, if the waste to be deposited at the site is produced by the forest products operations and is predominantly solid, non-hazardous process waste, such as woodwaste, effluent treatment solids, hog fired boiler ash, recycling process rejects, lime mud, grits or dregs. O. Reg. 232/98, s. 28 (4).

Final Cover

29. (1) The owner and the operator of a landfilling site shall ensure that the following materials are applied to the waste fill zone as final cover, from bottom to top:

1. A minimum of 0.6 metres of cover material.

2. A minimum of 0.15 metres of topsoil or other material approved by the Director as able to sustain plant growth.

3. A vegetative cover consisting of vegetation that is suited to local conditions and that is capable with minimal care of providing vigorous, plentiful cover not later than its third growing season. O. Reg. 232/98, s. 29 (1).

(2) The owner and the operator of a landfilling site shall ensure that the final cover is designed so that,

(a) the infiltration rate through the final cover is in accordance with the design for the site respecting ground water protection prepared under section 10;

(b) any existing or anticipated facilities for the control, collection, use or discharge of landfill gas are accommodated; and

(c) the requirements for the end use of the site, as described in the site design report prepared under section 6 and the closure report prepared under section 31, are met. O. Reg. 232/98, s. 29 (2).

Final Slopes

30. (1) The owner and the operator of a landfilling site shall ensure that the final slopes above grade within the waste fill zone at the time of site closure do not exceed one unit vertical to four units horizontal and are not less than one unit vertical to 20 units horizontal. O. Reg. 232/98, s. 30 (1).

(2) Subsection (1) does not apply if a written report has been prepared that confirms that an alternative design for the final slopes is acceptable, having regard to the slope stability of the deposited waste and final cover, the potential for erosion of the final cover, the proposed end use of the site and the infiltration requirements for ground water protection. O. Reg. 232/98, s. 30 (2).

PART VI CLOSURE

Closure Report

31. The owner and the operator of a landfilling site shall ensure that a written report on activities for the closure of the site, activities for the post-closure care of the site and the proposed end use of the site is prepared not later than the date 90 per cent of the total waste disposal volume is reached or two years before the anticipated date of closure, whichever comes first. O. Reg. 232/98, s. 31.

Annual Post-Closure Care Report

32. The owner and the operator of a landfilling site shall ensure that, within three months after each anniversary of the date on which waste was last placed on the site, an annual report is prepared respecting the

post-closure care of the landfilling site, including a summary of results from monitoring programs. O. Reg. 232/98, s. 32.

33. Omitted (provides for coming into force of provisions of this Regulation). O. Reg. 232/98, s. 33.

TABLE 1
LEACHATE CHARACTERISTICS (SECTION 10)

Column 1
Column 2
Column 3
Column 4
Column 5
Column 6

Contaminant
Initial Source Concentration (mg/L)
Mass as a proportion of total (wet) mass of waste (mg/kg)
Half-Life in Leachate (years)
Health Related Drinking Water Objective (mg/L)
Aesthetic Drinking Water Objective (mg/L)

1. Benzene
0.02
0.014
25
0.005
n/a

2. Cadmium
0.05
0.035
n/a
0.005
n/a

3. Chloride
1,500
1,800
n/a
n/a
250

$\leq 150,000$ t/ha increasing to $\geq 250,000$ t/ha
increasing to 2,500

4. Lead
0.6
0.42
n/a
0.01
n/a

5. 1,4 Di-chlorobenzene
0.01

0.007
50
n/a
0.001

6. Dichloro-methane

3.3
2.3
10
0.05
n/a

7. Toluene

1.0
0.7
15
n/a
0.024

8. Vinyl Chloride

0.055
0.039
25
0.002
n/a

Notes:

1. The initial source concentration of chloride is taken to vary linearly between 1,500 and 2,500 milligrams per litre with maximum waste loading between 150,000 and 250,000 tonnes per hectare.

2. Half-lives may be used in considering a decrease in source concentration with time and for estimating the contaminating life span.

O. Reg. 232/98, Table 1.

TABLE 2

MAXIMUM WASTE LOADINGS FOR GENERIC DESIGN OPTIONS (SECTION 10)

Background Chloride Concentration (mg/L)
Maximum Waste Loading (m3/ha)

Column 1
Column 2

Single Liner Design Option (Subsection 10 (4))
Double Liner Design Option (Subsection 10 (5))

0
98,500
287,000

10

100,500
295,500

20
102,500
299,500

30
104,000
303,000

40
106,000
307,000

50
107,500
310,500

60
109,000
314,000

70
110,500
317,500

80
112,000
321,500

90
113,500
325,000

100
115,000
328,500

110
117,000
332,000

120
118,500
335,500

130
120,000
339,000

140
121,500
343,000

150

123,500
346,500

160
125,000
350,000

170
126,500
353,500

180
128,000
357,000

190
129,500
360,500

200
131,000
363,500

210
132,500
366,500

220
134,500
370,000

230
136,000
373,000

240
137,500
376,000

250 or more
139,000
380,000

Note: If the Background Chloride Concentration falls between two values in Table 2, the appropriate limiting value shall be interpolated from the values in Column 1 or 2, whichever applies. These values are considered to vary linearly with the values for chloride.

O. Reg. 232/98, Table 2.

SCHEDULE 1
SERVICE LIVES — PRIMARY LEACHATE COLLECTION SYSTEMS (SECTIONS 6 AND 10)

100-Year Service Life

1. A landfilling site's primary leachate collection system, consisting of perforated collection pipes bedded in a layer of stones with a separating layer above and below the stones, may be assumed to have a service life of 100 years, starting at the earlier of the mid-point of the site's operating life and the tenth anniversary of the first deposit of waste in the waste fill zone, if the following conditions are met:

1. The pipes must be bedded in a continuous layer of stones that extends completely across the base of the waste fill zone and that has a minimum thickness of 0.3 metres on the base side slopes and a minimum thickness of 0.5 metres elsewhere. The stones must have a D85 of not less than 37 millimetres, a D10 of not less than 19 millimetres, a uniformity coefficient (D60/D10) of less than 2.0, and, when measured by weight, not more than 1.0 per cent of the stones may pass the US #200 sieve.

2. A suitable geotextile or graded granular separator must be installed between the stone layer and the overlying waste and between the stone layer and any underlying soil or liner.

3. The perforated leachate collection pipes must be made of high density polyethylene (HDPE), with a minimum internal diameter of 150 millimetres and with perforations not less than 12 millimetres in diameter located along and around the pipes so that,

i. the hydraulic capacity of the perforations can readily accommodate the expected quantity of leachate,

ii. leachate that enters the pipes can readily flow within the pipes,

iii. blockage by sedimentation is minimized, and

iv. the structural integrity of the pipes is maintained.

4. The perforated leachate collection pipes must be bedded in the stones so that there is at least 250 millimetres of stones above the pipes and at least 50 millimetres of stones below the pipes.

5. The perforated leachate collection pipes must be placed across the base of the waste fill zone, excluding the base side slopes, and spaced so that the drainage path before leachate can potentially intercept a collection pipe is not more than 50 metres in length.

6. The leachate collection pipes must have adequate structural integrity to withstand impacts from waste placement and other site operations and to withstand the weight of the waste, cover material and any structures that may be located over them.

7. Leachate collection pipes must be inspected at least annually for the first five years after placement of waste overtop of each pipe and then as often as future inspections indicate to be necessary.

8. Leachate collection pipes must be cleaned whenever an inspection indicates that cleaning is necessary.

9. Leachate must be removed from the collection system in order to avoid obstructions to leachate flows within the system.

10. The base of the waste fill zone must be contoured to provide minimum surface grades of 0.5 per cent toward the leachate collection pipes.

11. Sludge must not be deposited in the waste fill zone in a manner that would allow sludge to move into the leachate collection system and promote biological clogging.

75-Year Service Life

2. A landfilling site's primary leachate collection system, consisting of perforated collection pipes bedded in a layer of stones with a separating layer above and below the stones, may be assumed to have a service life of 75 years, starting at the earlier of the mid-point of the site's operating life and the tenth anniversary of the

first deposit of waste in the waste fill zone, if all of the conditions set out above for a 100-year service life are met with the following changes:

1. The requirement that the layer of stones in which the pipes are bedded have a minimum thickness of 0.5 metres elsewhere than the base side slopes is changed to a requirement that the layer have a minimum thickness of 0.3 metres elsewhere than the base side slopes.
2. The requirement that the perforated leachate collection pipes be bedded in the stones so that there is at least 250 millimetres of stones above the pipes and at least 50 millimetres of stones below the pipes must be met, but local thickening of the layer of stones is acceptable.
3. The requirement that the perforated leachate collection pipes be spaced so that the drainage path before leachate can potentially intercept a collection pipe is not more than 50 metres in length is changed to a requirement that the pipes be spaced so that the drainage path before leachate can potentially intercept a collection pipe is not more than 25 metres in length.

60-Year Service Life

3. A landfilling site's primary leachate collection system, consisting of perforated collection pipes bedded in a layer of stones with a separating layer above and below the stones, may be assumed to have a service life of 60 years, starting at the earlier of the mid-point of the site's operating life and the tenth anniversary of the first deposit of waste in the waste fill zone, if all of the conditions set out above for a 100-year service life are met with the following changes:

1. The requirement that the layer of stones in which the pipes are bedded have a minimum thickness of 0.5 metres elsewhere than the base side slopes is changed to a requirement that the layer have a minimum thickness of 0.3 metres elsewhere than the base side slopes.
2. The requirement that the perforated leachate collection pipes be bedded in the stones so that there is at least 250 millimetres of stones above the pipes and at least 50 millimetres of stones below the pipes must be met, but local thickening of the layer of stones is acceptable.

4. In this Schedule,

(a) D85 for stones in a stone layer is the stone diameter such that, when measured by weight, 85 per cent of the stones in the layer have a smaller diameter;

(b) D60 for stones in a stone layer is the stone diameter such that, when measured by weight, 60 per cent of the stones in the layer have a smaller diameter; and

(c) D10 for stones in a stone layer is the stone diameter such that, when measured by weight, 10 per cent of the stones in the layer have a smaller diameter.

O. Reg. 232/98, Sched. 1.

SCHEDULE 2

SERVICE LIVES — SECONDARY LEACHATE COLLECTION SYSTEMS (SECTIONS 6 AND 10)

1,000-Year Service Life

1. A landfilling site's secondary leachate collection system, consisting of perforated collection pipes bedded in a layer of stones with a separating layer above and below the stones, may be assumed to have a service life of 1,000 years, starting at the earlier of the mid-point of the site's operating life and the tenth anniversary of the first deposit of waste in the waste fill zone, if the following conditions are met:

1. The pipes must be bedded in a continuous layer of stones that extends completely across the base of the waste fill zone, including the base side slopes, and that has a minimum thickness of 0.3 metres. The stones must have a D85 of not less than 37 millimetres, a D10 of not less than 19 millimetres, a uniformity coefficient (D60/D10) of less than 2.0, and, when measured by weight, not more than 1.0 per cent of the stones may pass the US #200 sieve.
2. A suitable geotextile or graded granular separator must be installed between the stone layer and any underlying soil or liner and between the stone layer and any overlying material.
3. The perforated leachate collection pipes must be made of high density polyethylene (HDPE), with a minimum internal diameter of 150 millimetres and with perforations not less than 12 millimetres in diameter located along and around the pipes so that,
 - i. the hydraulic capacity of the perforations can readily accommodate the expected quantity of leachate,
 - ii. leachate that enters the pipes can readily flow within the pipes,
 - iii. blockage by sedimentation is minimized, and
 - iv. the structural integrity of the pipes is maintained.
4. The perforated leachate collection pipes must be bedded in the stones so that there is at least 250 millimetres of stones above the pipes and at least 50 millimetres of stones below the pipes. Local thickening of the layer of stones is acceptable.
5. The perforated leachate collection pipes must be placed across the base of the waste fill zone, excluding the base side slopes, and spaced so that the drainage path before leachate can potentially intercept a collection pipe is not more than 100 metres in length.
6. The leachate collection pipes must have adequate structural integrity to withstand impacts from waste placement and other site operations and to withstand the weight of the waste, cover material and any structures that may be located over them.
7. Leachate collection pipes must be inspected at least annually for the first five years after the initial production of leachate from the secondary leachate collection system and then as often as future inspections indicate to be necessary.
8. Leachate collection pipes must be cleaned whenever an inspection indicates that cleaning is necessary.
9. Leachate must be removed from the collection system in order to avoid obstructions to leachate flows within the system.
10. The base of the waste fill zone must be contoured to provide minimum surface grades of 0.5 per cent toward the leachate collection pipes.

2. In this Schedule,

- (a) D85 for stones in a stone layer is the stone diameter such that, when measured by weight, 85 per cent of the stones in the layer have a smaller diameter;
- (b) D60 for stones in a stone layer is the stone diameter such that, when measured by weight, 60 per cent of the stones in the layer have a smaller diameter; and
- (c) D10 for stones in a stone layer is the stone diameter such that, when measured by weight, 10 per cent of the stones in the layer have a smaller diameter.

O. Reg. 232/98, Sched. 2.

SCHEDULE 3

SERVICE LIVES — GEOMEMBRANE LINERS (SECTIONS 6 AND 10)

Primary Liner — 150-Year Service Life

1. The geomembrane used as part of a landfilling site's primary liner may be assumed to have a service life of 150 years, starting at the earlier of the mid-point of the site's operating life and the tenth anniversary of the first deposit of waste in the waste fill zone, if the following conditions are met:

1. The geomembrane must be made of high density polyethylene (HDPE) and must have a thickness of at least 1.5 millimetres.

2. The oxidative induction time of the geomembrane must exceed,

i. 100 minutes, as determined by ASTM D3895-95 (American Society for Testing and Materials Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry), as it may be amended from time to time, or

ii. 250 minutes, as determined by ASTM D5885-95 (American Society for Testing and Materials Standard Test Method for Oxidative-Induction Time of Polyolefin Geosynthetics by High-Pressure Differential Scanning Calorimetry), as it may be amended from time to time.

3. The oxidative induction time of the geomembrane after oven aging at 85 degrees Celsius for 90 days, as described in ASTM D5721-95 (American Society for Testing and Materials Standard Practice for Air-Oven Aging of Polyolefin Geomembranes), as it may be amended from time to time, must exceed,

i. 80 per cent of the value for the original geomembrane, as determined by ASTM D3895-95 (American Society for Testing and Materials Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry), as it may be amended from time to time, or

ii. 80 per cent of the value for the original geomembrane, as determined by ASTM D5885-95 (American Society for Testing and Materials Standard Test Method for Oxidative-Induction Time of Polyolefin Geosynthetics by High-Pressure Differential Scanning Calorimetry), as it may be amended from time to time.

4. The geomembrane must be installed in direct and uniform contact with a suitable foundation or clayey liner.

5. The geomembrane must be protected against puncturing and load-induced damage at all times, including during installation.

6. During installation, care must be taken to,

i. remove wrinkles in the geomembrane,

ii. minimize stress concentration,

iii. ensure high quality seams,

iv. minimize differential settlement,

v. minimize exposure to ultraviolet light,

vi. prevent damage due to sliding,

vii. prevent damage due to installation in cold conditions, and

viii. prevent damage due to rodents.

Secondary Liner — 350-Year Service Life

2. The geomembrane used as part of a landfilling site's secondary liner may be assumed to have a service life of 350 years, starting at the earlier of the mid-point of the site's operating life and the tenth anniversary of the first deposit of waste in the waste fill zone, if all of the conditions set out above for a 150-year service life are met with the following change:

1. The requirement that the geomembrane have a thickness of at least 1.5 millimetres is changed to a requirement that the geomembrane have a thickness of at least 2.0 millimetres.

O. Reg. 232/98, Sched. 3; O. Reg. 483/98, s. 1.

SCHEDULE 4

SERVICE LIVES — COMPACTED CLAYEY LINERS (SECTIONS 6 AND 10)

Unlimited Service Life

1. A landfilling site's compacted clayey liner may be assumed to have an unlimited service life if the following conditions are met:

1. The liner must be,

i. at least 0.75 metres thick and compacted in at least five lifts, or

ii. at least 0.6 metres thick and compacted in at least four lifts, if the liner is not constructed over a leachate collection system and is not used in conjunction with a geomembrane as part of a composite liner.

2. Each of the lifts in which the liner is compacted must be not more than 0.15 metres in compacted thickness.

3. Appropriate mineralogical studies or other leachate compatibility studies must indicate that the clayey material is not likely to experience a significant increase in hydraulic conductivity due to interaction with leachate.

4. During installation, care must be taken to,

i. control soil properties and water content,

ii. ensure the breakup of clods,

iii. control lift thickness and compaction,

iv. remove stones larger than 100 millimetres,

v. prevent desiccation of the compacted clayey liner,

vi. prevent damage to the compacted clayey liner due to freezing,

vii. prevent damage to the compacted clayey liner from vehicular traffic,

viii. prevent damage to the compacted clayey liner due to rodents, and

ix. prevent damage to the compacted clayey liner due to differential settlement.

5. The report of a suitably qualified geotechnical engineer must confirm that there is no evident cracking in the constructed liner or significant occurrence of clods, stones, branches or other material that could shorten the service life of the constructed liner or significantly increase the hydraulic conductivity.

O. Reg. 232/98, Sched. 4.