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| <b>POLICY TITLE</b> ENGINEERED FACILITIES AT LANDFILLS THAT<br>RECEIVE MUNICIPAL AND NON-HAZARDOUS WASTES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>NO.</b><br>14-15-01                                                                                                                                                                          |                                |                                                                                                                                                                                                 |
| <u>Legislative Authority</u><br><br>The Environmental Protection Act                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                 |                                |                                                                                                                                                                                                 |
| <u>Statement of Principles</u><br><br>In order to protect the environment and human health, the Ministry will review and evaluate applications for new landfills and landfill expansions in accordance with the following position statement:<br><br>An engineered facility must function as long as necessary for the protection of the environment.<br><br>If periodic or continuous maintenance or replacement is required, evidence must be provided by the applicant that this can and will be accomplished.<br><br>This policy is written in accordance with the Ministry's current policy 15-08 entitled "The Incorporation of the Reasonable Use Concept into the Ground Water Management Activities of the Ministry of the Environment".<br><br><u>Definitions</u><br><br><table border="0"><tr><td><u>Contaminating Life Span</u></td><td>It is defined as the period of time during which the landfill will produce contaminants at levels that could have unacceptable impact if they were discharged into the surrounding environment.</td></tr></table> |                                                                                                                                                                                                 | <u>Contaminating Life Span</u> | It is defined as the period of time during which the landfill will produce contaminants at levels that could have unacceptable impact if they were discharged into the surrounding environment. |
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| <u>Point of Contact</u> Director, Waste Management Branch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                 |                                |                                                                                                                                                                                                 |
| <u>Effective Date</u><br><br>May 11, 1988                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                 |                                |                                                                                                                                                                                                 |

- 1.0 Scope This policy applies to applicants for new or expanded landfill sites which receive municipal and non-hazardous wastes and to Ministry staff responsible for the review and evaluation of such proposals.
- 2.0 MOE Responsibility The Ministry will review and evaluate all applications for new and expanded landfill sites in accordance with the covering statement of principles and the Ministry's governing Guideline document (noted below).
- 3.0 Applicant's Responsibility The applicant will be responsible for providing Ministry staff with sufficient evidence to adequately review and evaluate his/her proposal.
- 3.1 Service Life It is the applicant's responsibility to define the service life of an engineered facility and indicate the frequency of replacement and the number of times it must be replaced.
- 3.2 Contaminating Life Span In doing so, the applicant must address the contaminating life span of the landfill, equate this with the proposed service life of the engineered facility and support any procedures he/she intends to use ensure that the service life of the facility exceeds the contaminating life span of the landfill.
- 4.0 Further Guidance Further guidance with respect to the use of landfill liners, leachate collection and treatment facilities, landfill covers and rapid stabilization and leachate recycling is provided in the Ministry's "Guideline on Engineered Facilities at Landfills that Receive Municipal and Non-Hazardous Wastes" dated March 1988.

Copies of the above noted document can be obtained from the Ministry's Waste Management Branch

MINISTRY GUIDELINE  
FOR ENGINEERED FACILITIES AT LANDFILLS  
THAT RECEIVE MUNICIPAL AND NON HAZARDOUS WASTE

(APRIL 20, 1988)

This document addresses engineered facilities at sites receiving municipal and non hazardous wastes. Engineered facilities at sites receiving hazardous wastes, as defined by Regulation 309, will be dealt with on a case-by-case basis.

Some level of engineering is necessary for all modern landfills both for the protection of the environment from the discharge of unacceptable levels of liquid and gaseous contaminants, and for aesthetic reasons. The specific engineered facilities that are required on a particular landfill depend on the environmental conditions that are present and the type of waste, and thus can only be judged on a case-by-case basis. In some cases, this may entail only simple ditching or grading for the control of surface run off, in others complex leachate and gas control facilities may be required. (The scope of the term "engineered facility" is discussed at the end of this document).

The Ministry's "Reasonable Use" Policy (MOE Policy 15-08: The Incorporation of the Reasonable Use Concept into the Ground Water Management Activities of the Ministry of the Environment), sets limits to the level of ground-water contamination and applies to discharges from landfills. Landfills, including those with engineered facilities, must meet the requirements of this Policy.

POSITION STATEMENT

It is the Ministry's position that there are limitations to engineered facilities and it prefers sites in environments with characteristics that provide a high degree of natural protection (e.g. thick clay deposits.)

The acceptability of an engineered facility for a new landfill or a landfill that is expanding will be judged in accordance with the following:

"AN ENGINEERED FACILITY MUST FUNCTION AS LONG AS NECESSARY FOR THE PROTECTION OF THE ENVIRONMENT. IF PERIODIC OR CONTINUOUS MAINTENANCE OR REPLACEMENT OF AN ENGINEERED FACILITY OR ITS PARTS IS REQUIRED, EVIDENCE MUST BE PROVIDED BY THE APPLICANT THAT THIS CAN AND WILL BE ACCOMPLISHED. IT IS THE APPLICANT'S RESPONSIBILITY TO DEFINE THE SERVICE LIFE OF AN ENGINEERED FACILITY AND INDICATE THE FREQUENCY OF REPLACEMENT AND THE NUMBER OF

TIMES IT MUST BE REPLACED. IN SO DOING, THE APPLICANT MUST ADDRESS THE CONTAMINATING LIFESPAN' (i.e. THE TIME PERIOD DURING WHICH THE LANDFILL WILL PRODUCE CONTAMINANTS AT LEVELS THAT COULD HAVE AN UNACCEPTABLE IMPACT IF THEY WERE TO BE DISCHARGED INTO THE SURROUNDING ENVIRONMENT) OF THE LANDFILL, EQUATE THIS WITH THE SERVICE LIFE OF THE PROPOSED ENGINEERED FACILITY, AND SUPPORT ANY PROCEDURES HE INTENDS TO USE TO ENSURE THAT THE SERVICE LIFE OF THE FACILITY EXCEEDS THE CONTAMINATING LIFESPAN OF THE LANDFILL". THE MINISTRY WILL REVIEW AND EVALUATE THE APPLICANT'S PROPOSAL.

Engineered facilities (or combinations of facilities) will meet the following requirements:

1. It must be possible to monitor the engineered facility to verify that it performs to specification. Monitoring must be able to warn of failure sufficiently in advance to allow contingency measures to be taken. Contingency measures are designed to accommodate any failure in the design of a landfill and are not a part of the normal operation during the life of the facility.
2. The contaminating lifespan of the landfill must be addressed in the contexts of the service lives of the various engineered facilities that are used to control contamination.
3. Provision must be made for the maintenance of an engineered facility and its operation for as long as is required under the Position Statement. A detailed outline of how funding will be provided, who will bear the short-term and ultimate responsibility for the facility, the length of time that the facility will be operating, and recommendations as to the conditions under which the facility can be closed down or no longer monitored or maintained must be provided in an application.
4. Manuals on the design of various types of engineered contaminant control facilities, such as covers and liners, are available. However, some of these are very specialized and are new technologies. Under these circumstances the Ministry will require technical supporting data on the performance of these systems.
5. If an applicant cannot specify the time period for the decommissioning of an engineered facility the Ministry will consider that the facility will be required indefinitely and provisions for its perpetual care, maintenance and replacement must be provided. This is the responsibility of the applicant.

The Ministry will apply this Guideline to specific types of engineered facilities as discussed in the following pages. Other types of engineered facilities will be addressed if the need arises.

#### LANDFILL LINERS

Synthetic Membrane Liners: To function properly, a synthetic membrane liner must retain its integrity (i.e. function as designed) for the contaminating lifespan of the landfill. The state-of-the-art does not allow precise determination of rates of attenuation or degradation of leachate in lined landfills. Therefore, in the absence of data or site-specific information to the contrary, where complete attenuation of the contaminants in the leachate is necessary, the Ministry will require that the containment facilities be maintained in perpetuity. At the present time, synthetic membrane liners cannot meet this requirement and in addition they cannot be replaced when they fail.

The Ministry is also concerned about the difficulty in providing monitoring systems for landfills with synthetic membrane liners. Such systems must have appropriately long service lives and provide sufficiently early warning of failure to allow effective contingency actions, should these be necessary.

For these reasons, the Ministry will not support proposals that depend upon synthetic membrane liners to confine leachate in landfills in perpetuity.

Earth and Clay Liners: Earth and clay liners may serve to reduce leachate discharge and confine leachate for collection and to attenuate some of the contaminants in leachate migrating out of a landfill. They may be used alone or in conjunction with synthetic membrane or other types of liners. Applicants proposing to use earth or clay liners should address these matters in their submissions to the Ministry.

#### LEACHATE COLLECTION FACILITIES AND LEACHATE TREATMENT FACILITIES

To serve effectively leachate collection facilities and leachate treatment facilities must function for the contaminating lifespan of the landfill. The state-of-the-art does not allow precise determination of rates of attenuation or degradation of leachate within landfills. Therefore in the absence of data or site specific information to the contrary, where the complete attenuation of the contaminants in the leachate is necessary, the Ministry will require that these collection facilities and treatment facilities be maintained in perpetuity.

Leachate collection facilities and leachate treatment facilities must be designed, constructed, operated and monitored by professional staff and require competent technical staff for their continued maintenance, repair and replacement. Where approved, the Ministry will require that adequate resources be dedicated to the maintenance of any leachate collection, treatment, transporting and disposal facilities for as long as the leachate remains a potential hazard to the environment.

#### LANDFILL COVERS

Synthetic Membrane Covers: Synthetic membrane covers are used to prevent or significantly decrease infiltration into a landfill in order to reduce the rate of leachate production. This reduction of infiltration retards decomposition and extends the contaminating lifespan of a landfill. Consequently, this type of cover is not encouraged by the Ministry in situations where it would delay stabilization of the wastes. An applicant proposing such a cover must establish the contaminating lifespan of the landfill and provide for maintenance and periodic replacement of the cover as long as required. In the absence of evidence to the contrary, this will be considered to be in perpetuity.

Synthetic membrane covers will impede the upward venting of gases, and in particular methane, and in so doing may increase the distance these gases migrate laterally. These concerns should also be addressed in submissions to the Ministry.

"Clay" Covers: Clay covers (covers incorporating fine textured earth materials) are also intended to reduce infiltration into landfills. Such covers require maintenance to ensure proper growth of vegetation and to prevent failure by erosion and fissuring. Resources for these maintenance activities should be identified by an applicant.

#### RAPID STABILIZATION AND LEACHATE RECYCLING

Rapid stabilization of a landfill is a process intended to accelerate the biodegradation of the waste and reduce the time period during which settlement is most rapid and the landfill produces its most highly contaminating leachate. Although the technology has been known for 15 to 20 years, and has been used in some operating landfills there is little documented information from practical successful operations.

While rapid stabilization will accelerate the biological degradation and leaching of a landfill it does not create a contaminant-free waste. A "stabilized" landfill still produces methane and a contaminating leachate.

Leachate recycling, entails pumping the leachate produced from a landfill, back into the landfill. This is the basis for most rapid stabilization operations but is also used as a means of delaying the handling and disposal of leachate by temporarily storing this leachate in the landfill. In most instances this will be a short-term measure and leachate, will eventually accumulate to a volume that exceeds the storage capacity of the landfill. Disposal must then be made in a manner acceptable to the Ministry.

The Ministry is also concerned that leachate recycling will create added head on the base of the landfill and this will cause an increase in the amount of leachate discharge to the surrounding soils. These matters should be addressed by an applicant.

An important aspect of this Guideline is the requirement that, if the contaminating lifespan of the landfill is not addressed in an applicant's submission, the Ministry will assume that certain engineered facilities must function in perpetuity. Rapid stabilization of the landfill is the only known method of shortening this contaminating lifespan so that contaminants released to the environment can be attenuated by natural processes. In light of the shortage of practical field data on this process, submissions should be conservative and supported by practical contingency measures in the event that stabilization is not as effective as predicted.

#### CONCLUDING STATEMENT

It is recognized that this Guideline will restrict the use of engineered facilities as a means of landfilling in sensitive hydrogeologic environments. It is felt, however, that the level of control required by this Guideline is necessary to protect Ontario's clean environment and valuable ground and surface water resources. Where some reasonable level of natural protection is present or where practical contingency measures are possible, the Ministry will actively consider an applicant's proposal for engineered facilities so that new technology can be field tested and proven.

### SCOPE OF THE TERM ENGINEERED FACILITY

This guideline applies to all engineered facilities associated with the control of contaminants produced from landfills that receive municipal and non-hazardous wastes. This includes the design, installation and maintenance of:

- a) Liners, or combinations of liners beneath landfills (plastic, membrane, earth, clay, etc.)
- b) Landfill covers, (plastic, membrane, earth, clay, etc.)
- c) Leachate collection facilities (drains, tiles, ditches, etc.)
- d) Gas collection, interception and venting facilities.
- e) Monitoring facilities (for ground and surface waters and for gas)
- f) Leachate treatment facilities
- g) Facilities for the control of contaminated ground water (purge wells, grout curtains, etc.)
- h) Facilities for "stabilizing" a landfill or decreasing the time during which the landfill produces contaminants.

This Guideline applies to the assessment of new landfills or landfills requiring expansion. Although some of the principles on which the Guideline is based are applicable to closed landfills or landfills requiring remedial measures for contaminant control, the Guideline itself is not intended to be applicable to them. They must be dealt with on a case-by-case basis.

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