Guidelines for the Handling, Treatment and Disposal of Septage

NOVA SCOTIA

Environment and Labour

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I. PURPOSE

(a) The purpose of these guidelines is to provide guidance for the proper handling, treatment and disposal of septage while protecting the health of the public and the quality of the environment.

(b) These guidelines also provide guidance as to the requirements to obtain an approval to construct, operate and close a septage stabilization lagoon.

II. LEGISLATION

(a) Section 50(2) of the *Environment Act* reads as follows:

> **50(2)** No person shall commence or continue any activity designated by the regulations as requiring an approval, unless that person holds the appropriate approval.

(b) Section 3(1) of the *Activities Designation Regulations* reads as follows:

> **3(1)** Any activity designated in these regulations requires an approval from the Minister or an Administrator designated by the Minister.

(c) Section 7(2)(c)(i) of the *Activities Designation Regulations* reads as follows:

> **7(2)(c)(i)** The construction, operation or reclamation of a septage works, including treatment and disposal facilities, is designated as an activity.

(d) Section 37 of the *On-site Sewage Disposal Systems Regulations* reads as follows:

> **37(1)** No person shall engage in the business of cleaning a septic tank or hold themselves out as a septic tank cleaner without first having registered with the Department.
>
> **(2)** The Department shall keep a list of names registered under subsection (1) and make the list available to the public ."
>
> **(3)** No septic tank cleaner shall dispose of sewage except at a disposal facility approved by the Department.

III. DEFINITIONS

(a) "biosolids" means the stabilized organic solid or semi-solid residual materials produced during the treatment of domestic sewage and septage in a wastewater treatment facility or stabilization lagoon and rendered suitable for beneficial reuse;

(b) “closure” means the decommissioning of a septage lagoon(s) following cessation of operation of the lagoon(s) for the disposal of septage including temporary shut down for a period of more than twelve consecutive months;

(c) “department” means Nova Scotia Environment and Labour;

(d) “dewater” means to increase the solids concentration of sludge or biosolids to a cake like consistency (generally greater than 15% solids);

(e) “disposal” means the discharge, deposit, injection, dumping, or placing of any septage, septage supernatant, or sludge into the environment, but does not include on-site sewage disposal systems constructed and installed to treat sewage;

(f) “septage” means the combined untreated human waste, liquid (supernatant) and solid or semi-solid materials, removed from septic tanks, chemical toilets, portable toilets, holding tanks, vault privies, pit privies, pump chambers, syphon chambers and any other container which holds untreated human waste;

(g) “septage treatment” means a treatment process that prepares the septage for final disposal or reuse by stabilizing the septage;

(h) “septic tank cleaner” means a person who is engaged in emptying and disposing of the contents of a cesspool, a septic tank, a portable toilet, a holding tank or a vault privy and is registered pursuant to Section 37 of the *On-Site Sewage Disposal System Regulations*;

(i) “sludge” means an organic solid or semi-solid residual material generated during the treatment of raw sewage or septage in a wastewater treatment facility or a stabilization lagoon;

(j) “stabilize” means to make the organic or volatile portion of the septage or sludge less putrescible, less odorous, and to decrease the concentration of pathogenic microorganisms;

(k) “stabilization lagoon” means facultative (both aerobic and anaerobic), aerobic or anaerobic lagoon capable of degrading the organic matter in septage through the action of microorganisms in the presence of oxygen (aerobic) or absence of oxygen (anaerobic) for the purposes of stabilization, volume reduction and pathogen reduction;

(l) “supernatant” means the liquid portion of septage removed from a septic tank or a stabilization lagoon. This liquid may be high in concentrations of suspended solids and dissolved organics requiring additional treatment before final disposal;

(m) “wastewater treatment facility” means a publicly or privately owned facility for the treatment of wastewater, but does not include an on-site sewage disposal system or a septage stabilization lagoon.

IV. INTRODUCTION

Homes in the rural areas of Nova Scotia are generally served by individual on-site sewage disposal systems with central wastewater collection and treatment services only offered in more populated communities around the province. To ensure proper maintenance of an on-site sewage disposal system, it is recommended that the septic tank be pumped empty of solids every two to three years, depending upon use, so that accumulated solids do not carry over into the disposal bed and plug the field, potentially causing the system to malfunction.

A home owner can obtain the services of a septic tank cleaner who will pump the septic tank of its' contents and either discharge the septage in a stabilization lagoon or dispose of it at a wastewater treatment facility. The septage pumped from individual septic tanks is not considered adequately stabilized to be applied directly on land. Therefore, septage is **not** permitted to be applied directly on land without further treatment. These guidelines provide guidance for the treatment and/or disposal of septage by the use of stabilization lagoons or at a wastewater treatment facility.

The purpose of the stabilization lagoons is to allow the septage to be further stabilized, in addition to the anaerobic decomposition that occurs in the septic tank itself, thereby reducing the number of pathogens and making the organic or volatile portions of the septage less putrescible. Stabilization lagoons must be properly designed and operated. Proper operation includes the disposal of the supernatant from the lagoons as required and the treatment, removal and proper disposal of the sludge or reuse of biosolids which accumulate over time in the bottom of the lagoons.

Recently, a few septic pumpers have been experimenting with the use of various types of dewatering equipment where the liquid portion of the septage is either put back into the septic tank or discharged to a wastewater treatment facility for further treatment. This option has the potential to assist with the capacity of the stabilization lagoons or possibly even eliminate the need for lagoons at some point in the future.

IV. SEPTAGE TREATMENT AND DISPOSAL OPTIONS

There are a number of options available for treatment and stabilization of the septage, sludge and supernatant, disposal of the sludge or the reuse of biosolids. This section provides guidance for the various options available in each of these areas.

(a) Treatment of Septage

As discussed earlier, the septage pumped from individual septic tanks is not considered adequately stabilized to be applied directly on land. Therefore, the application of the septage pumped directly from septic tanks onto land without further treatment is **NOT** permitted. Acceptable treatment and disposal can be

accomplished by the following options:

(1) Septage may be further treated by placing the septage into properly designed stabilization lagoons. Refer to the *Atlantic Canada Standards and Guidelines Manual: for the Collection, Treatment, and Disposal of Sanitary Sewage*.

(2) Septage may be transferred from the pumper truck to a wastewater treatment facility approved to treat such waste. This option is not commonly utilized in Nova Scotia as the majority of the treatment facilities do not have either the hydraulic and / or treatment capacity to handle materials from outside the treatment facilities' collection area. Apart from these problems, the majority of existing treatment plants in Nova Scotia offer limited potential for septage treatment or disposal. There are a number of reasons for this, the major one being the relative strength of raw septage in comparison to raw domestic sewage. High BOD, solid and grease content of the septage can result in operational problems at a treatment plant. Other points to consider besides the theoretical capacity of the plant include:

(i) the discharge of septage shall be controlled and supervised. Discharge of materials other than septage or discharge above the recommended quantities could present serious problems. Supervision where facility staff divide their time between a number of plants can be a problem; Industrial/commercial sources may require prior approval from NSEL prior to disposal to the facility.

(ii) septage haulers also pump vault privies at campgrounds, construction sites and outdoor public gatherings. This can be a source of material such as cans, rocks, and bottles that don't normally find their way into a treatment plant. If this becomes a problem, a special receiving manhole with screen and or grit chamber will be required; and

(iii) since most wastewater treatment facilities are not designed to deal with the high suspended solids loadings found in septage, solids build up at the treatment plant will be accelerated, requiring more frequent sludge disposal in an acceptable manner.

(3) Septage may be discharged into a stabilization lagoon located adjacent to an approved wastewater treatment facility and utilize the treatment facility to treat only the supernatant from the lagoon. In this way the disposal of the biosolids remains the responsibility of the owner of the stabilization lagoons.

(4) Septage may be treated on site by a dewatering vehicle that is capable of removing the solids from the septage and pumping the supernatant back in the septic tank. This has the advantage of reducing trucking costs,

reducing stabilization lagoon volumes and /or preparing the solids for use directly in composting or other suitable treatment method, subject to NSEL approval; thereby eliminating the need for lagoons.

(5) An alternate to dewatering on site is to locate the dewatering equipment at a wastewater treatment facility and transport the septage to the dewatering unit. The supernatant is sent to the wastewater treatment facility and the dewatered solids must be treated and disposed of as discussed under the sludge disposal options.

(b) Disposal of Sludge or Biosolids

The sludge generated as a result of stabilization lagoon operation requires proper disposal. Although stabilization of the sludge has taken place in the lagoons, additional stabilization or treatment measures may be required to generate biosolids of acceptable quality, depending on the disposal or reuse option chosen.

Sludges generated in septage stabilization lagoons can be:

(1) dewatered, stabilized and applied to approved land application sites (biosolids only)[1];

(2) dewatered and composted at an approved facility;

(3) incinerated at an approved facility;

(4) disposed at an approved landfill if there are contaminants present in the material that would preclude the ability to meet compost guidelines.; or

(5) processed into a fertilizer at an approved facility and regulated under the *Canadian Fertilizer Act* and Regulations.

(c) Disposal of Supernatant

Supernatant can be generated at various stages during the handling of septage, depending on the procedures utilized.
If generated as a result of dewatering the septage at the septic tank, the supernatant can be returned to the septic tank. This practice should only be conducted if the discharge of the supernatant into the septic tank will not result in solids being carried over into the disposal field. Dewatering equipment can also

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[1] Only stabilized biosolids meeting acceptable quality are permitted for disposal on land. They must be shown to be of beneficial use (i.e: contribute to the nutrient requirements or provide valuable organic content). Criteria for the utilization of biosolids on land can be found in the *Guidelines for Land Application and Storage of Biosolids in Nova Scotia*. Section 23 of the *Activities Designation Regulations* stipulates that departmental approval is required for land application of non-livestock generated wastes, wastewaters and wastewater sludges.

be located at an approved wastewater treatment facility. In this case, the supernatant can be treated through the wastewater treatment plant.

Supernatant/liquid effluent from stabilization lagoons or any other treatment process for septage can be disposed of through the following methods:

(1) at an approved wastewater treatment facility, provided the facility has the capacity and capability of treating the supernatant/liquid effluent;

(2) in approved subsurface disposal systems which are designed by a Professional Engineer in accordance with the *On-site Sewage Disposal Systems Regulations* and the department's *On-Site Sewage Disposal Systems Technical Guidelines*; or

(3) treatment and discharge to a watercourse provided the treatment process is approved by the department and the liquid effluent quality meets the requirements as specified in the *Atlantic Canada Standards and Guidelines Manual for the Collection, Treatment and Disposal of Sanitary Sewag*e, latest edition*.*

Percolation or evaporation are not acceptable as methods of disposing of the supernatant from stabilization lagoons. On an annual average, the rate of precipitation in Nova Scotia is greater than that of evaporation and therefore the contents of any lagoon are more likely to increase than decrease. Lagoons must be designed with liners that reduce percolation (see Table 2).

The remaining sections of this document focus on the siting and design of stabilization lagoons. Additional information relating to the use of stabilization lagoons or wastewater treatment facilities for the treatment of septage can be found in the *Atlantic Canada Standards and Guidelines Manual for the Collection, Treatment and Disposal of Sanitary Sewage*, latest edition.

VI. USE OF STABILIZATION LAGOONS FOR THE TREATMENT OF SEPTAGE

The use of stabilization lagoon systems for septage treatment is common in Canada. These lagoons vary widely in their design, operation, and maintenance, and range from single-celled stabilization ponds to multi-celled basins. All of these units essentially function as unheated facultative or anaerobic digesters that retain the settleable solids while allowing the supernatant to be drawn off into a second polishing lagoon or treated and disposed of by one of the methods specified in Section V(c). The supernatant thus undergoes further treatment and the solids retained in the lagoon are further stabilized by anaerobic decomposition. These solids must be periodically removed from the lagoon for disposal. All treatment and disposal practices require regulatory approval.

As with all treatment methods, the proper location of lagoon sites is critical to the safe operation of such facilities. Site locations must be inspected and approved by the department during the phases of the design and installation of such systems. Due consideration must be given to the usual factors of soil and hydrogeological characteristics in the vicinity of the site, rainfall patterns, surrounding land uses, facility design (including loading rates, capacity, etc.) and protection of public health and water quality.

VII. SITE SELECTION FOR STABILIZATION LAGOONS

(a) General Requirements

New lagoons shall be sited in order to meet the separation distances as outlined in Table 1 to ensure that public and private drinking water supplies will not be adversely affected and where the potential for air, land and water pollution is minimized. Additional siting information may be obtained from the *Atlantic Canada Standards and Guidelines Manual for the Collection, Treatment and Disposal of Sanitary Sewage*, latest edition.

Table 1. Minimum Setback Distances for New Stabilization Lagoons

Type of Feature	Minimum Setback Distance
Public & Private Wells	300 m
Property Line (3rd Party)	30 m
Dwellings in Built Up Area	300 m
Isolated Dwellings	150 m
Water Bodies & Watercourses	120 m
Primary & Secondary Roads	100 m

(b) Groundwater Protection

Stabilization lagoons will not be located over surficial geological formations of high permeability (> 8×10^{-6} m/sec). The lagoon cells shall be lined as indicated in Table 2.

(c) Flood Plains

Stabilization lagoons shall not be located within the 100 year flood plain or in an area which has greater than 1% chance of flooding in any year. (Climate change needs to be considered in delineating the 100 year floodplain.)

(d) Source Water Protection Areas

Stabilization lagoons shall not be located in the source water protection areas for a municipal drinking water supply.

(e) Land Use Restrictions

The proponent shall notify the municipality within whose jurisdiction the facility is to be built to ensure it conforms with all land use by-laws and zoning restrictions.

VIII. DESIGN CRITERIA FOR STABILIZATION LAGOONS

Table 2 presents the minimum design standards for septage lagoons. Additional design information may be obtained from the *Atlantic Canada Standards and Guidelines Manual for the Collection, Treatment and Disposal of Sanitary Sewage*, latest edition.

Table 2. Septage Lagoon Design Guidelines

Parameter	Guidelines
Configuration	Two primary lagoon cells in parallel with another (secondary) lagoon as a decant for the supernatant, and control of discharge to the secondary lagoon. A parallel system of similar lagoons should also be considered in order to facilitate proper maintenance of each series of lagoons. Two lagoons in series may suffice where a plan is in place to ensure an alternate method of stabilization and that alternate disposal methods are available during sludge removal.
Design siting	
Minimum vertical separation distance between lagoon bottom and maximum groundwater elevation or bedrock	1.2 m for both primary and secondary lagoons.
Monitoring	Monitoring wells shall be required. Surface water sampling may be required.
Fencing and signs	1.2 m fence - The lagoons shall be enclosed with a suitable fence to preclude livestock and discourage trespassing. The fence should be located on the outer perimeter at a distance of 500 mm from the top outside edge of the embankment. Fencing should not obstruct vehicle traffic on top of the berm.
Entrance gate and sign	A lockable gate shall be installed at the entrance with a sign providing the operator's name and emergency contact information.
Grading	Adequate to prevent surface runoff water from entering lagoons. Slopes should be seeded with a suitable grass to prevent erosion.
Receiving Station(s)	Suitable chamber and screen. Provisions to discharge septage beneath the liquid level of the lagoon (if required).
Odour Control (if required)	Lime or other proven methods.

Table 2. Septage Lagoon Design Guidelines	
Parameter	**Guidelines**
Cell Liners	Both primary and secondary cells shall be lined. If earthen construction, the cell bottoms shall be lined with a minimum of 0.5 metre of material 10^{-6} cm/sec or equivalent. If synthetic liner the minimum thickness shall be 60 mil for a HDPE liner underlain by at least 150 mm of sand. A QA/QC installation program shall be instituted.*
Design Sizing	
Retention Time	Retention time required must be adequate to provide a quality of stabilized septage suitable for the chosen method of disposal.**
Sizing Criteria	Based on the total of: 1. Estimated pumping volume 2. Solids retention volume 3. Net precipitation
Minimum Lagoon Depth	0.6 m
pH Control	pH control may be necessary. A pH of 8.0 or greater will normally control odours.
Volume Measurement	Fixed staff gauge with increments to monitor volume and operating level of each lagoon.
Freeboard	1 m both primary and secondary lagoons.

* For existing unlined earthen lagoons it must be shown that the in-situ materials meet the minimum criteria for hydraulic conductivity.

** Based on the chosen option of disposal for both the stabilized sludge and the supernatant, these lagoons will have to be relatively large particularly if operated in the anaerobic mode. The capacity of the primary lagoon system should provide a retention time of no less than 365 days and the secondary lagoon(s) no less than 180 days. It is not uncommon that primary lagoon systems must have a retention time as great as 500 days to properly stabilize the sludges.

IX. OPERATION AND MAINTENANCE OF STABILIZATION LAGOONS

Although stabilization lagoons themselves are simple in nature, proper operation, and maintenance is required so they function and continue to function in the future as designed. An operation and maintenance manual is required to be prepared for each facility to outline how it is to be run. This manual shall contain the following:

(a) A routine monitoring program which shall include monitoring of the sludge depth, when sludge was removed from the lagoons and where it was disposed of, the quality of the supernatant, as well as data gathered as a result of the groundwater and surface water monitoring programs specified in the approval.

(b) The lagoons shall be operated in a manner which will not result in the generation of hazardous or offensive odours at the property line.

(c) A standard procedure to address and record odour complaints shall be described in detail.

(d) A maintenance program shall be initiated to ensure that the site condition remains as designed. The maintenance program should include but is not limited to:

- mowing embankments and surrounding areas;
- preventing growth of trees and shrubs on lagoon embankments;
- maintenance of signs and fencing.

(e) Records shall be maintained of pumpers using the facility, including volumes discharged and dates. These records shall be kept for a period of at least three years, and be available for inspection by the department upon request.

(f) An annual report shall be submitted to the department. The annual report shall include but is not limited to:

- a summary and discussion of the quantity of septage treated during the reporting period compared to design, including maximum daily volume and monthly volumes;
- a summary and interpretation of analytical results from monitoring programs;
- a summary of any complaints received and action taken to respond to the complaints;
- a summary of any emergency or upset conditions and corrective action taken;
- a summary of the status of compliance with the Approval for the facility.

(g) Emergency Procedures outlining actions to be taken by owners and staff at the facility in the event of foreseeable emergencies including but not limited to: fires, spills, accidents, equipment malfunctions, contamination with incompatible materials or hazardous wastes, etc. shall be prepared and kept up to date.

X. APPLICATION FOR APPROVAL OF A STABILIZATION LAGOON

An application for construction and operation of a stabilization lagoon shall be processed under the *Approvals Procedure Regulations*. In addition to the applicable information outlined in Section 5(1) of the *Approvals Procedure Regulations*, the following additional information shall also accompany an application submitted to the department for approval:

(a) all setback distances noted in Table 1 shall be included and shown on the site map;

(b) a detailed description of the lagoon design criteria as denoted in Table 2 shall be included;

(c) detailed description of the geology, hydrogeology, and soils at the proposed site prepared by a Professional Engineer or Professional Geoscientist. Test pits or monitoring wells must be completed under the direction of a Professional Engineer or Professional Geoscientist, and be of sufficient number to adequately evaluate subsurface conditions at the site. This should include depth to bedrock and watertable. If bedrock or water are not encountered in the test pits, assurance must be given by sufficient test pit depth that the minimum separation distances between both primary and secondary lagoon floor levels and the highest watertable level and bedrock are met as required in Table 2;

(d) the background information detailing the chemical and bacteriological composition of the septage to be treated and the disposal method to be utilized for the supernatant and sludges or biosolids;

(e) a surface and groundwater sampling program designed by a qualified consultant including groundwater flow direction and adequate number of monitoring wells to show that the lagoons are not adversely affecting groundwater quality. See Appendix I "Typical Surface and Groundwater Monitoring Program";

(f) Proposed supernatant disposal method and supporting design information; and

(g) the volumes of septage to be treated, the quantity of sludges generated, the frequency at which sludges will have to be disposed of and the disposal method.

The department may require that the proponent undertake a public notification plan or consultation process and submit results of that plan or process with the application.

The department may require, as part of the application process, that financial security be posted with the department in such an amount and form as determined by the Administrator.

XI. CLOSURE

Notification: Written notification of site closure is required within a minimum of 30 days prior to closure. The closure notice shall include a Closure Plan.

Two types of closure plans will be considered for approval.

The preferred closure plan (a) is a “clean closure” whereby all of the lagoon contents (liquid and solid) are removed and disposed of in an approved manner. The alternative closure plan (b) involves the disposal of supernatant in an approved manner and the in-situ burial of the solids in accordance with an approved plan. Closure plans shall be approved by the department prior to commencement.

(a) Preferred Closure Plan

(1) The preferred closure plan shall be implemented by all facilities that have been constructed and approved for operation after January 1, 2005 as well as any facility that the department deems to be causing or likely to cause an adverse effect. The preferred closure plan shall include, but is not limited to, the following:

- an engineering plan at a suitable scale showing existing and proposed finished grades;
- written methodology on handling and disposal of the lagoon contents;
- chemical and biological analyses of supernatant and sludge as referenced below; and
- scheduling and equipment/material details.

(2) The liquid contents of the lagoons shall be removed and disposed of at an approved facility as outlined in Section V(c), or in a manner approved in writing by NSEL.

(3) All sludge that is removed from the site must be stabilized in an approved manner. Sludge stabilization can be completed by composting in accordance with the *Nova Scotia Environment and Labour Composting Facility Guidelines*, or in a manner outlined in the *Guidelines for Land Application and Storage of Biosolids in Nova Scotia.*

(4) A chemical/metals analysis is required to confirm the suitability of the sludge prior to utilization. Refer to the *Guidelines for Land Application and Storage of Biosolids in Nova Scotia.*

(5) A surface and groundwater monitoring program may be required as part of a “clean closure” where there are indications of potential adverse effects to groundwater or surface water. Where required, the surface and groundwater monitoring program shall be completed by a hydrogeologist, or an engineer experienced in this field in a manner acceptable to the

department (See Appendix 1). The location of sampling wells shall be selected to be representative of local groundwater conditions and flow direction. Risk factors shall be clearly identified, surface streams, groundwater users, etc. Monitoring shall be carried out on the site until the department agrees in writing that it is no longer required.

(6) Upon completion of dewatering and sludge removal, the site shall be infilled with local fill, and graded to prevent the ponding of surface water and to permit drainage away from the site. The surrounding area shall be ditched where required by the department. Suitable vegetative cover shall be established immediately.

(7) A final closure report shall be completed by the owner or their consultant confirming the facility has been decommissioned in accordance with the approved closure plan and submitted to the department for approval. Annual reports with quarterly inspection reports shall be filed by the owner or their consultant until such time as a final closure report is completed. These shall include monitoring results and information on maintenance and site work carried out over this period, and identify any problems or concerns at the site.

(b) Alternative Closure Plan

(1) The alternative closure plan may be implemented by facilities that were constructed prior to January 1, 2005 and where the department believes that implementation of such a method of closure will not result in an adverse effect. The alternative closure plan shall include, but is not limited to, the following:

- an engineering plan at a suitable scale showing existing and proposed finished grades;
- written methodology on handling and disposal of the lagoon contents;
- chemical and biological analyses of supernatant and sludge as referenced below; and
- scheduling and equipment/material details.

(2) The liquids contents of the lagoons shall be removed and disposed of at an approved facility as outlined in Section V(c), or in a manner approved in writing by NSEL.

(3) Sludge that will be buried on-site shall be stabilized in accordance with the *Guidelines for Land Application and Storage of Biosolids in Nova Scotia* and tested for metal content/leachability in accordance with the *Guidelines for Disposal of Contaminated Solids in Landfills*.

(4) The alternative closure plan may include surface and groundwater monitoring; ongoing maintenance of the site including all required site regrading; and posting and maintenance of signage. The surface and groundwater monitoring program shall be completed by a hydrogeologist, or an engineer experienced in this field in a manner acceptable to the department (See Appendix 1). The location of sampling wells shall be selected to be representative of local groundwater conditions and flow direction. Risk factors shall be clearly identified, surface streams, groundwater users, etc. Monitoring shall be carried out on the site until the department agrees in writing that it is no longer required.

(5) Upon completion of dewatering, the site shall be infilled, capped with a minimum of one metre of clay or low permeability soil (less than 1×10^{-6} cm/sec), and graded to prevent the ponding of surface water and to permit drainage away from the site. Suitable vegetative cover shall be established immediately.

(6) The site shall be recorded in the Registry of Deeds as a former septage disposal facility.

(7) A final closure report shall be completed by the owner or their consultant confirming the facility has been decommissioned in accordance with the approved closure plan and submitted to the department for approval. Annual reports with quarterly inspection reports shall be filed by the owner or their consultant until such time as a final closure report is completed. These shall include monitoring results and information on maintenance and site work carried out over this period, and identify any problems or concerns at the site.

Dated: February 22, 2006

Original Signed by:
Gerard MacLellan
Executive Director
Environmental Monitoring and Compliance Division

APPENDIX 1

TYPICAL SURFACE AND GROUNDWATER MONITORING PROGRAM

1.0 SITE ASSESSMENT AND DESIGN

1.1 Hydrogeologic Assessment

Prior to the establishment or expansion of a site, a report shall be prepared by the owner containing plans, specifications, and descriptions of the hydrogeologic conditions of the site, adjacent and nearby properties, and the regional area in which the site is located, including at a minimum, the following;

.1 a general description of the regional geologic and hydrogeologic conditions occurring within 5 km of the site. This description should identify any unstable soils or bedrock, indicate the location and nature of any boundaries to groundwater movement, and characterize the significance of groundwater resources and the use made of these resources;

.2 a description of local hydrogeologic conditions occurring at the site, and adjacent and other properties within 500 m of the site, and the description shall indicate how local conditions relate to regional conditions;

.3 a detailed hydrogeologic investigation of the site which establishes soil, rock, and groundwater conditions;

.4 an interpretation of the results of the detailed hydrogeologic investigation of the site, including plans, specifications, and descriptions:

.5 an assessment of the suitability of the site for septage stabilization lagoon purposes considering the regional, local, and site specific hydrogeologic conditions, the design of the site, and a contingency plan for the control of any unauthorized releases from the site.

1.2 Surface Water Assessment

Prior to the establishment or expansion of a site, a report shall be prepared by the owner containing plans, specifications, and descriptions of the surface water conditions of the site, adjacent and nearby properties, and the regional area in which the site is located, including, at a minimum, the following:

.1 a general description of the surface water features occurring within 5 km of the site that is based on the contributing/receiving drainage area, catchment, subwatershed or watershed that is sufficiently large to assess the range and extent of potential effects. This description will include, but

not be limited to, flood plains, natural watercourses, drainage paths and boundaries, streamflows, surface water quality, and sources of water supply;

.2 a description of the local surface water features occurring at the site, and adjacent and other properties within 500 m of the site, and the description shall include how local feature relate to regional features;

.3 a detailed surface water investigation of the site to assess water quality, quantity, and habitat conditions of the surface water features identified on site;

.4 an interpretation of the results of the detailed surface water investigation of the site, including plans, specifications, and descriptions;

.5 an assessment of the suitability of the site for waste disposal purposes considering the regional, local, and site specific surface water conditions, the design of the site, and the contingency plan for the control of any unauthorized releases from the site.

2.0 OPERATION AND MONITORING

2.1 Groundwater Monitoring

A program for monitoring groundwater quality and quantity shall be carried out by the Approval Holder and shall include, at a minimum, the following:

.1 representative samples of groundwater within the site shall be:

a) obtained from groundwater monitoring facilities initially, and as requested by the department, and be analyzed for the parameters listed in column 1 of Schedule 1; and

b) obtained quarterly from groundwater monitoring facilities and be analyzed for:
- Total and fecal coliform
- BOD_5
- any other parameter required by conditions of the approval

.2 the results of analysis of all water samples collected in the groundwater monitoring program, together with an assessment of these results shall be provided to the department in an annual report;

.3 the parameters to be monitored may be amended where the owner prepares a report showing alternative parameters should be monitored.

2.2 Surface Water Monitoring

A program for monitoring surface water quality and quantity, where required, shall be carried out by the owner and shall include, at a minimum, the following:

.1 representative samples of surface water being discharged from the site and of any waterbody, including upstream control locations, which may be affected by the site, shall be:

a) obtained annually, and be analyzed for the parameters listed in column 3 of Schedule 1 and for other parameters of concern identified in the surface water assessment;

b) obtained quarterly and be analyzed for:
- Total and fecal coliform
- BOD_5
- TSS
- any other parameter required by conditions of the approval

.2 the results and assessment of the results of the surface water monitoring shall be provided to the department in an annual report;

.3 the parameter to be monitored may be amended where the owner prepares a report showing alternative parameters should be monitored.

Schedule 1
Groundwater, Leachate and Surface Water Monitoring Parameters

Parameter				
Parameter Group	Column 1	Column 2	Column 3	Column 4
	Comprehensive List for Groundwater	Indicator List for Groundwater	Comprehensive List for Surface Water	Indicator List for Surface Water
Inorganics				
	Alkalinity	Alkalinity	Alkalinity	Alkalinity
	Ammonia		Ammonia	Ammonia
	Arsenic		Arsenic	
	Barium		Barium	
	Boron		Boron	
	Cadmium	Cadmium	Cadmium	
	Calcium	Calcium		
	Chloride	Chloride	Chloride	Chloride
	Chromium		Chromium	
	Conductivity	Conductivity	Conductivity	Conductivity
	Copper		Copper	
	Iron	Iron	Iron	
	Lead	Lead	Lead	
	Magnesium	Magnesium		
	Manganese			
	Mercury		Mercury	
	Nitrate	Nitrate	Nitrate	Nitrate
	Nitrite		Nitrite	Nitrite
	Total Kjeldahl Nitrogen		Total Kjeldahl Nitrogen	Total Kjeldahl Nitrogen
	pH	pH	pH	pH

Parameter				
Parameter Group	Column 1	Column 2	Column 3	Column 4
	Comprehensive List for Groundwater	Indicator List for Groundwater	Comprehensive List for Surface Water	Indicator List for Surface Water
	Total Phosphorus		Total Phosphorus	Total Phosphorus
	Potassium	Potassium		
	Sodium	Sodium		
	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids
	Total Dissolved Solids	Total Dissolved Solids	Total Dissolved Solids	Total Dissolved Solids
	Total & Fecal Coliform	Total & Fecal Coliform	Total & Fecal Coliform	Total & Fecal Coliform
	Sulphate	Sulphate	Sulphate	Sulphate
	Zinc		Zinc	
Other Organics				
			Biochemical Oxygen Demand (BOD_5)	Biochemical Oxygen Demand (BOD_5)
			Chemical Oxygen Demand	Chemical Oxygen Demand
	Dissolved Organic Carbon	Dissolved Organic Carbon	Total Organic Carbon	
			Phenol	Phenol
Field Parameters				
			Temperature	Temperature
			pH	pH
			Conductivity	Conductivity
			Dissolved Oxygen	Dissolved Oxygen
			Flow	Flow