Draft Septage Treatment Guides

Ontario Association of Sewage Industry Services

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MANAGEMENT of SEPTAGE

- In order to successfully end the practice of spreading untreated septage, there must be sufficient capacity to treat septage at municipal sewage treatment plants or with alternative viable treatment options.
- Science-based standards are essential to those who want to develop effective septage treatment.
- Standards for treated septage will assist septage haulers and municipalities to evaluate and develop alternative septage treatment options.
- Several municipalities are considering alternative septage treatment methods, which require significantly less capital investment than upgrading treatment capacity at existing sewage treatment plants, and need the standards to help them with their decision.
- These science-based guides are also intended to provide guidance to the staff of MOE and OMAFRA as part of the review process for approvals.
- The ministry has worked closely with stakeholders to develop treatment standards to manage septage in Ontario.

SEPTAGE TREATMENT GUIDES

- The three draft guides were posted on the Environmental Registry for comment on September 8, 2008 for a 45 day comment period closing on October 23, 2008:
    - Land Application of Treated Domestic Septage
    - Alkaline Stabilization of Domestic Septage
    - Disposal of Septage in Dewatering Trenches.

LAND APPLICATION of DOMESTIC SEPTAGE

- The guide for land application of treated domestic septage sets out standards for safe use of treated septage from treatment processes on agricultural land, (e.g., alkaline stabilization, composting, geotubes, anaerobic digestion).
- The guide was developed using results of analysis of approximately 400 samples of Ontario septage.
- Draft standards include:
    - pathogen criteria
    - metals concentrations
    - screening and
    - maximum application rates.
- Sampling not required for pathogens and metals for domestic septage; however, site must be sampled for metals and nutrients.
- Organic soil conditioning site Certificate of Approval required for treated septage.
- Waste disposal site Certificate of Approval required for untreated septage.
- The guide includes a form which haulers should use for recording information, e.g., the source, type and volume of septage received.

LAND APPLICATION
SEPTAGE HAULER OPERATION LOG

Date of Collection	(dd/mmm/yyyy)	(dd/mmm/yyyy)	(dd/mmm/yyyy)
Name of Generator (name of business, facility, homeowner)			
Address of Generator	Street Number Rural Route Street Name Municipality (City, Town, etc.)	Street Number Rural Route Street Name Municipality (City, Town, etc.)	Street Number Rural Route Street Name Municipality (City, Town, etc.)
Source of Septage	☐ Private Dwelling ☐ Commercial ☐ Institutional ☐ Industrial	☐ Private Dwelling ☐ Commercial ☐ Institutional ☐ Industrial	☐ Private Dwelling ☐ Commercial ☐ Institutional ☐ Industrial
Type of Septage *Note:* Domestic septage contains wastes of a domestic nature (from sinks and toilets) only. It does NOT include waste from grease traps.	☐ Domestic ☐ Non-Domestic ☐ Holding Tank waste ☐ Septic Tank waste ☐ Portable Toilet waste	☐ Domestic ☐ Non-Domestic ☐ Holding Tank waste ☐ Septic Tank waste ☐ Portable Toilet waste	☐ Domestic ☐ Non-Domestic ☐ Holding Tank waste ☐ Septic Tank waste ☐ Portable Toilet waste

LAND APPLICATION
SEPTAGE HAULER OPERATION LOG

Date of Collection	(dd/mmm/yyyy)	(dd/mmm/yyyy)	(dd/mmm/yyyy)
Volume of Septage	☐ litres ☐ gallons (imperial) ☐ other, please specify:	☐ litres ☐ gallons (imperial) ☐ other, please specify:	☐ litres ☐ gallons (imperial) ☐ other, please specify:
In-Truck Treatment	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Receiving Facility (Facility to which the septage is delivered)	☐ Sewage treatment plant ☐ In-transit storage facility ☐ Dewatering Trench ☐ Transfer / Processing / Landfill facility, please specify: ☐ Land application ☐ Other, please specify:	☐ Sewage treatment plant ☐ In-transit storage facility ☐ Dewatering Trench ☐ Transfer / Processing / Landfill facility, please specify: ☐ Land application ☐ Other, please specify:	☐ Sewage treatment plant ☐ In-transit storage facility ☐ Dewatering Trench ☐ Transfer / Processing / Landfill facility, please specify: ☐ Land application ☐ Other, please specify:
Facility Municipality	Municipality (Town, City, etc.)	Municipality (Town, City, etc.)	Municipality (Town, City, etc.)
MOE Certificate of Approval Number of Receiving Facility	Format: A12-3456 or 1234-ABCD	Format: A12-3456 or 1234-ABCD	Format: A12-3456 or 1234-ABCD
Date Septage Received at Facility	(dd/mmm/yyyy)	(dd/mmm/yyyy)	(dd/mmm/yyyy)

LAND APPLICATION DEFINITION

- “domestic septage” means human body waste, toilet or other bathroom waste, waste from showers or tubs, liquid or water borne kitchen or sink waste or laundry waste, including waste that does not come from a household, but only if the waste is similar to the waste from a household. Domestic septage does not include:
  - grease removed from grease traps from commercial, institutional or industrial kitchens such as restaurants
  - liquid or solid material removed from the first compartment of multiple-compartment septic tanks used by commercial, institutional or industrial kitchens which do not have grease traps
  - wastewater or wastes from washing machines located at commercial, institutional or industrial laundries
  - wastewater resulting from manufacturing or production processes
  - wastewater containing any amount of the wastes listed under (1) to (5) inclusive.

LAND APPLICATION STANDARDS

- The concentration of Escherichia coli (E. coli) in the processed waste is not more than 2 x 10^6 colony forming units per gram of total solids (dry weight).
- Eleven regulated metals:
  - same standards as Nutrient Management Regulation
  - 2 columns, depending on the total solids concentration of the material.
- Must pass through a screen. The following types of screens are practical and acceptable for reducing foreign objects:
  - screen with square or round openings, each of which is not greater than ¾ inch square or in diameter; or
  - bar screen with ½ inch opening between parallel bars.
- For waste from a portable toilet, contains no more than 0.5 percent dry weight of plastic objects and no more than 2 percent dry weight of other non-biodegradable objects, including, but not limited to, glass, plastics and metal objects.
- Must be land applied based on criteria and regulations in the MOE/OMAFRA *Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land,* or for farms which are required to have a Nutrient Management Plan, the Nutrient Management Regulation, O.Reg. 267/03.
- Biosolids Guide Website: http://www.ene.gov.on.ca/envision/gp/3425e.pdf

LAND APPLICATION METALS STANDARDS

Regulated Metals	Maximum metal concentration in materials that contain total solids dry weight of less than 10,000 milligrams per litre	Maximum metal concentration in materials that contain total solids dry weight of 10,000 milligrams or more per litre	Maximum permissible metal addition to soil receiving treated domestic septage	Maximum metal concentration in soils receiving treated domestic septage
	(mg of metal / L)	(mg of metal/ kg of total solids dry weight)	(kg / ha / 5 Years)	(mg / kg of soil dry weight)
Arsenic	1.70	170	1.40	14
Cadmium	0.34	34	0.27	1.6
Cobalt	3.40	340	2.70	20
Chromium	28	2800	23.30	120
Copper	17	1700	13.60	100
Mercury	0.11	11	0.09	0.5
Molybdenum	0.94	94	0.80	4
Nickel	4.20	420	3.56	32
Lead	11	1100	9.00	60
Selenium	0.34	34	0.27	1.6
Zinc	42	4200	33.00	220

LAND APPLICATION
MAXIMUM APPLICATION RATE - OPTION 1

Pre-determined Maximum Application Rates

- Calculated based on analysis of nitrogen and metals data available from over 400 samples of wastes from septic and holding tanks and from portable toilets.
- The data indicated that these three types of wastes had different nitrogen concentrations and therefore require different application rates for beneficial use for crop production.
- Recommended maximum application rates for three different crop groups for each type of waste.
- Application to crops not listed should not exceed the rates set for “Cereals, wheat, pasture, non-harvested vegetation cover” or a rate which will have to be approved by OMAFRA on a case-by-case basis.

OPTION 1 - PRE-DETERMINED MAXIMUM APPLICATION RATES

Crop	Maximum Annual Application Rate (m^3/ha)
Wastes from Portable Toilets	
Corn and forage	70
Soybeans, alfalfa, clover, legumes	48
Cereals, wheat, pasture, non-harvested vegetation cover	24
Wastes from Residential Holding Tanks	
Corn and forage	1,100
Soybeans, alfalfa, clover, legumes	730
Cereals, wheat, pasture, non-harvested vegetation cover	360
Wastes from Septic Tanks	
Corn and forage	300
Soybeans, alfalfa, clover, legumes	200
Cereals, wheat, pasture, non-harvested vegetation cover	100

LAND APPLICATION
MAXIMUM APPLICATION RATE - OPTION 2

Calculating Application Rates Using Formulae

- Formulae are provided to calculate the application rate based on
  - Nitrogen (N) and Phosphorus (P) requirements of the crop,
  - previous four years metal additions,
  - amount of N and P provided by other nutrients applied to the same receiving field in the same application year, and
  - estimated additions of N, P and metals for the current application.
- The maximum allowable loading would be based on the most stringent loading rate calculated.

Row Number	Parameters Column 2	Types of Domestic Septage		
		Portable Toilet Column 3	Holding Tank Column 4	Septic Tank Column 5
1	Plant Available Nitrogen (PAN)	V_N = (kg N/ha required or removed) * (10/21)	V_N = (kg N/ha required or removed) * (100/14)	V_N = (kg N/ha required or removed) * (100/49)

"V' is the septage loading rate based on that specific parameter.

LAND APPLICATION
MAXIMUM APPLICATION RATE - OPTION 3

Calculating Maximum Application Rates Using Analysis of Samples

- Septage should be sampled at least 4 times as indicated in a table for total Kjeldahl nitrogen, ammonia and ammonium nitrogen, total phosphorus, total solids, and the eleven regulated metals. The arithmetic mean of these results is used to calculate the annual application rate.

- Consult with an agronomist or OMAFRA to determine how to use the analysis to calculate application rate.

Parameters	Minimum Sampling Frequencies
TKN, ammonia and ammonium nitrogen, total phosphorus	One sample per 100 m^3 for each type of domestic septage (equivalent to 22,000 imperial gallons) treated and applied as NASM on agricultural land.
Total solids, 11 Regulated metals	One sample per 300 m^3 (equivalent to 66,000 imperial gallons) of each type of domestic septage treated and applied as NASM on agricultural land.

LAND APPLICATION
INDUSTRIAL and COMMERCIAL SEPTAGE

- Industrial and commercial septage are more variable than domestic septage so are not included in the guide, for instance, could contain other heavy metals, cleaning solvents.
- Pre-treatment requirements and permission to utilize commercial and industrial septage as nutrients on agricultural land must be reviewed and approved by MOE on a case-by-case basis.
- The hauler will need to obtain appropriate confirmation in writing from industrial and commercial clients regarding the substances found in their septage.
- Despite the fact that the guide does not apply to industrial and commercial septage, haulers should use the form in the guide for recording information, e.g., the source, type and volume of septage received.

ALKALINE STABILIZATION of DOMESTIC SEPTAGE

- Alkaline stabilization is the addition of alkali (lime) to septage, which kills pathogens and reduces odour.
- Standards in Guide to Land Application of Treated Domestic Septage apply to alkaline stabilized septage.
- In 2005,a pilot study with University of Guelph and septage haulers was undertaken and alkaline stabilization was found to be a feasible treatment option for septage haulers in Ontario.
- Draft standards include:
  - duration of treatment, pH measurement
  - screening – same as land application guide
  - monitoring and reporting requirements.
- This is the lowest cost treatment option available.
- The process is relatively easy, and can be done in-truck or on-site.
- *E. coli* testing is not required for alkaline treated septage provided that the procedures in the guide are followed.

ALKALINE STABILIZATION - pH

- Treatment should include addition of an alkaline material to raise the pH of the septage to not less than 12 and not greater than 12.5 for a minimum contact time of 30 minutes without further addition of an alkali.
- The pH can be measured by either litmus paper or by a calibrated pH meter.
- Alkaline stabilized septage may only be applied to soils with a pH less than 8.5.
- Different types of alkalis can be used to treat domestic septage:
  - sodium or potassium-based alkalis and industrial byproducts such as cement kiln dust
  - lime based products such as hydrated lime ("$Ca(OH)_2$"), quicklime ("CaO") or proprietary lime based solutions are often used
  - hydrated lime is often preferred due to ease of use, cost and availability.

ALKALINE STABILIZATION MONITORING and RECORDING REQUIREMENTS

- The information to be recorded in the example Process Operation Log sheet given in Appendix A of the guide includes:
  - name of the operator
  - date and time the untreated septage is delivered to the stationary treatment site
  - date and time that alkali stabilization was done
  - type(s) and volume of alkali added
  - volume of domestic septage treated
  - lapse time between the addition of alkali to the domestic septage and pH reading
  - pH measured
  - pH measured at the time of application if the treated septage is stored for more than 7 days between treatment and application
  - date and time treated septage is transported out of the stationary treatment site for final disposal at spreading field or approved waste disposal site
  - dates the meter was calibrated.
- The Log should be kept by the proponent for a minimum period of 5 years, and made available to MOE upon request.

ALKALINE STABILIZATION DOSAGE REQUIREMENTS

- The amount of alkali required to achieve a pH of 12 after the minimum of 30 minutes contact time can be affected by the type of domestic septage and the total solids in the domestic septage.
- The exact amount of alkali to be added can be determined by batch tests before treatment or developed over time with operating experience.
- Guide provides general guidance on dosage requirements for three different types of domestic septage.

Table 1 Hydrated Lime Dosage for Domestic Septage

Septage Type	Dosage (kg/1,000L)	Dosage (lb/1,000 Imperial gallon)
Septic Tank Waste	4 – 6	40 – 60
Holding Tank Waste	2 – 5	20 – 50
Portable Toilet Waste	15 – 20	150 – 200

DEWATERING TRENCHES DISPOSAL of SEPTAGE

- Dewatering trenches are long narrow trenches excavated in permeable soils – prior to final disposal.
- Dewatering trenches apply to all types of septage.
- They are mainly used in Northern Ontario where treatment, pre-treatment or other disposal methods are not readily available.
- The primary purpose is to reduce septage volume by controlled exfiltration.
- Draft standards include:
  - location, design
  - volume of septage
  - operation.
- Proposed to apply to new and renewal approvals.

DEWATERING TRENCHES LOCATION and DESIGN

Location

- There should be a minimum separation distance of 1.5m between the water table and the bottom of the trench to allow for effective treatment.
- There should be a minimum separation distance of 100 m from the property lot line of the property where a dewatering trench is located to the nearest residence.
- The trench should be excavated with the long axis approximately perpendicular to the groundwater flow direction.

Design

- Trenches should be no longer than 75 m, no wider than 3 m and no deeper than 1 m.
- The clear separation distance between dewatering trenches should be 5 – 10 metres to allow adequate sideways movement of infiltrate.
- The bottom of a dewatering trench should be sloped so that the septage is evenly distributed across the trench area starting at a depth of 15 centimetres and gradually sloping to a maximum 1 metre depth.

DEWATERING TRENCHES VOLUME and OPERATION

Volume

- The total allowable yearly volume of septage that can be deposited in any dewatering trench should be based on a six month annual disposal period with consideration for the permeability of the soil on the site using the method provided in the Guide.

Operation

- The septage should be screened during or prior to unloading to a dewatering trench to ensure foreign objects are removed
- The foreign objects captured by the screen must be disposed of at approved waste disposal site.
- The hauling trucks should unload into the shallow ends of the trench.
- The dewatered septage (dried residue) that is removed from the bottom of a trench should be removed regularly and disposed of at an approved waste disposal site.

NEXT STEPS

- Ministry staff are consulting with stakeholders until October 23, 2008.
- All comments received will be reviewed and considered as the guides are finalized.
- Final guides will be posted on the Environmental Registry and stakeholders will be notified.
- The guides will apply to approvals developed after the guides are finalized.
- MOE will work with OASIS to ensure training on the guides is provided for septage haulers.

SEPTAGE TREATMENT GUIDES

The draft Septage Treatment Guides are currently posted on the Environmental Registry for public comment. Comments can be submitted until October 23, 2008.

Website:

www.ontario.ca/environmentalregistry EBR Registry #: 010-0366

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