Consultation Draft
To
Ontario Regulation
Made under the
Nutrient Management Act, 2002

and

Nutrient Management Protocols

Construction and Siting Protocol

Biosecurity Protocol

Local Advisory Committee Protocol

November, 2002

Consultation Draft

ONTARIO REGULATION
made under the
NUTRIENT MANAGEMENT ACT, 2002

GENERAL

PART I
INTRODUCTION

DEFINITIONS

Definitions, general

1.1. (1) In this Regulation,

"accredited certifier" means a person who holds a Reviewer licence under **section 10.8**;

"agricultural leachate" means a solution that is contaminated; → too general →

"agricultural source material" means a prescribed material described in **section 1.6**;

"approved treatment system" means a treatment system approved by the Director that is capable of changing the characteristics of an input stream that contains dissolved nutrients to meet the quality standards set out in Part IX of this Regulation; → needs definition

"aquifer" means an underground formation of saturated permeable rock or loose material including soil that can produce useable quantities of water when tapped by a well;

"broker" means a person who,

(a) receives prescribed materials from an operation,

(b) does not generate a new nutrient product from those materials, and

(c) transfers the materials to another operation, applies the materials to land as nutrients on behalf of another person, or stores them for either of those purposes;

"broking operation" means an operation by virtue of which a person is a broker;

"commercial fertilizer" means a fertilizer, or supplement, as defined in the *Fertilizer Act* (Canada);

"compacted clay liner" means a seepage barrier with saturated hydraulic conductivity of 1×10^{-9} metres per second or less constructed of a cohesive soil that is compacted to increase its bulk dry density and homogeneity, reduce porosity and decrease soil permeability;

"compliant", in relation to a nutrient management strategy or plan, means a strategy or plan,

(a) that is approved or certified under this Regulation; or

(b) that is not approved or certified under this Regulation, but that is prepared and kept in accordance with this Regulation;

"concrete" means Portland cement concrete;

"container nursery" means an area of land that contains groups of plants, including the roots, in rigid or flexible pots, either above or below ground, managed by processes such as watering to promote growth from April to October in any year, and which may or may not be enclosed or covered from November to April;

"container nursery and greenhouse leachate" means agricultural leachate generated from a container nursery or greenhouse;

"contaminated" means an aqueous solution containing:

(a) a nutrient in a concentration that is ten times the ambient background water quality concentration of a contaminant listed in Schedule 4 to Ontario Regulation 459/00 made under the *Ontario Water Resources Act*, or

(b) containing E Coli at a density of over 1×10^3 colony forming units per gram of total solids, dry weight or Salmonella sp at a density of over three colony forming units per 4 grams of total solids, dry weight;

"contingency plan" means a proposal in a nutrient management strategy or plan for dealing with,

(a) an excess of prescribed materials or nutrients, in the event that the amount of prescribed materials or nutrients generated or received at a farm unit is greater than that otherwise provided for by the strategy or plan,

(b) an excess of prescribed materials or nutrients, in the event that the amount of prescribed materials or nutrients requiring storage prior to use exceeds or is anticipated to exceed the storage capacity available for prescribed materials or nutrients otherwise provided for by the strategy or plan,

(c) unanticipated releases of prescribed materials or nutrients from storage or during transport or application,

(d) inability to store, apply or otherwise use prescribed materials or nutrients as otherwise provided for by the strategy or plan, as a result of weather conditions or unavailability of equipment, or

(e) any other contingency requiring the handling or storage of prescribed materials or nutrients in an emergency;

"controls", in relation to land, an agricultural operation or a non-farm operation, includes manages and operates;

"designated health or educational facility" means land used for a designated facility as defined in Ontario Regulation 505/01 under the *Ontario Water Resources Act*, except land used for a school while the school is not in session;

"earth" means inorganic components of the earth's crust such as clay, silt, sand, gravel or any mixture of such components and may contain small amounts of organic materials;

"engineered material" means synthetic material or natural material that has been reworked to create material that meets a certain standard;

"farm unit" means land consisting of, or designated as, a farm unit under **section 1.4 (Farm units)**;

"flow path", in relation to a facility, site or outdoor confinement area, means a surface channel or depression that conducts liquids away from the facility, site or area;

"frozen soil" means soil that is consolidated by the presence of ice, in any layer with a minimum thickness of 2 centimetres, where the layer is located within the top 15 centimetres of the soil;

"generator" means a person who owns or controls an operation in the course of which prescribed materials are generated, and includes an intermediate generator;

"geomembrane liner" means a synthetic membrane with very low permeability used to control fluid migration in a nutrient storage facility;

"geosynthetic clay liner" means a liner that consists of high swelling sodium bentonite between two layers of geotextile fabric having a saturated hydraulic conductivity of 1×10^{-9} metres per second or less used to control fluid migration in an earthen nutrient storage facility;

"greenhouse" means an enclosed structure, or collection of structures, covered with a rigid or flexible glazing material, with sides that may or may not be open to the air, in which the environment is controlled for the cultivation or protection of plants for all or part of the year;

"high-density permanent outdoor confinement area" means a permanent outdoor confinement area where the livestock confined in the area, at any time, are capable of generating nutrients at a rate of more than 0.012 nutrient units per square metre annually;

"high-density seasonal outdoor confinement area" means a seasonal outdoor confinement area where the livestock confined in the area are capable of generating a maximum of more than 5 nutrient units per hectare, calculated on an annualized basis;

"hydraulically secure soil" means natural material that is uniform in nature and able to meet a specified maximum saturated hydraulic conductivity of 1×10^{-8} metres per second;

"infiltration strip" means a strip of land designed to allow runoff water to enter the soil from the surface;

"intermediate generator" means a person who owns or controls an intermediate operation;

"intermediate operation" means an operation carried out with prescribed materials generated in the course of another operation, resulting in the production of prescribed materials that have different characteristics from those of the materials in the form in which they were generated, such as nutrient content, density and volume;

"liquid", in relation to prescribed materials or nutrients, means prescribed materials or nutrients that are not solid;

"liquid transfer system" means all pipes and surfaces that come into contact with liquid prescribed materials but does not include the components of a permanent liquid nutrient storage facility or a vehicle that is used to transport liquid nutrients;

"livestock" includes poultry and ratites;

"low-density permanent outdoor confinement area" means a permanent outdoor confinement area where the livestock confined in the area, at any time, are not capable of generating nutrients at a rate of more than 0.012 nutrient units per square metre, annually;

"low-density seasonal outdoor confinement area" means a seasonal outdoor confinement area where the livestock confined in the area are not capable of generating nutrients at a rate of more than 5 nutrient units per hectare calculated on an annualized basis;

"municipal well" means a well that serves as a raw water supply for a municipal drinking-water system as defined under the *Safe Drinking-Water Act, 2003*;

"non-agricultural source material" means a prescribed material described in **section 1.7**;

"non-farm operation" means an operation, other than an agricultural operation,

(a) including intermediate and broking operations; and

(b) involving the generation, storage or application, of prescribed materials or nutrients;

"Nutrient Management Protocol" means the document of that name prepared by the Ministry for the purposes of this Regulation, as it may be amended from time to time after this Regulation is made;

"nutrient unit" means the amount of nutrients that give the fertilizer replacement value of the lower of 43 kilograms of nitrogen or 55 kilograms of phosphate as nutrient as established by reference to the Nutrient Management Protocol;

"observation station" means a device that intercepts the flow of liquid in a tile drain and that is used to collect, observe and monitor the amount and condition of liquid in the tile drain;

"observation and shut-off station" means an observation station that is equipped with a valve attached to the gravity outflow pipe to allow the flow of liquid in a tile drain to be shut off;

"operation" means an agricultural operation or a non-farm operation;

"operation identifier" means a unique identifier assigned by the Ministry to a farm unit or non-farm operation for the purposes of a nutrient management strategy or plan;

"outdoor confinement area" means a livestock enclosure with the following characteristics:

1. No roof.
2. Confinement by permanent or temporary farm-animal shelters and fences, penning, corrals or similar structures.
3. Permanent or portable feeding infrastructure (including mangers and watering tanks).
4. Livestock may or may not be fed in the enclosure.
5. Livestock may or may not have access to other buildings or structures for shelter or feeding.
6. Grazing and foraging provides less than 50% of dry matter intake;

"permanent liquid nutrient storage facility" means a permanent nutrient storage facility that is designed and constructed to contain liquid nutrients;

"permanent nutrient storage facility" means a nutrient storage facility, including a nutrient storage facility made of earth that is a permanent structure or part of a permanent structure but does not include,

(a) a permanent solid nutrient storage facility that has less than 14 days of storage capacity; or

(b) a permanent liquid nutrient storage facility that has less than 14 days of storage capacity and a maximum depth of liquid nutrient that is less than 100 milimetres;

"permanent outdoor confinement area" means an outdoor confinement area that is used for 200 days or more in total in a calendar year;

"permanent solid nutrient storage facility" means a permanent nutrient storage facility that is designed and constructed to contain solid nutrients;

"permanent water table" means the shallowest zone in the soil which normally has positive pressure as recorded in the water well records for the nearest water well or as determined by a test hole dug during the summer months;

"prescribed material" means a material described in **section 1.6 (Agricultural source materials or 1.7 (Non-agricultural source materials);**

"professional engineer" means an engineer who has a temporary licence or a licence under the *Professional Engineers Act*;

"professional geoscientist" means a person who is a member or a certificate holder in good standing of the Association of Professional Geoscientists of Ontario under the P*rofessional Geoscientists Act, 2000* other than a limited member or a non-practising member;

"residential area" means an area in which there are four or more adjacent lots of not more than one hectare, on each of which there is a residential building;

"seasonal outdoor confinement area" means an outdoor confinement area that is used for less than 200 days in total in a calendar year;

"site characterization" means a site characterization carried out in accordance with a study under **Part VIII (Construction Standards)**;

"snow-covered soil" means soil with a continuous layer of snow on the surface that has a minimum depth of 5 centimeters;

"solid", in relation to prescribed materials or nutrients, means having a moisture content of less than 82% (by weight, wet basis) or a slump of 150 millimetres or less using the Test Method for the Determination of Liquid Waste (slump test) set out in Schedule 5 of Regulation 347 made under the *Environmental Protection Act*;

"surface water" means surface water as defined in **section 1.2**;

"synthetic liner" means a geomembrane liner or a geosynthetic clay liner;

"temporary in-field nutrient storage site" means a location where solid nutrients are stored that is not a permanent nutrient storage facility;

"top", in relation to a bank of surface water, means,

(a) the edge of a defined channel or a bank of surface water, where there is a sharp change from the steep slope of the channel or bank to the shallower slope of the field area; or

(b) where no such break in slope exists, the normal full extent of the watercourse when it contains the maximum volume of water without flooding;

"two year time of travel zone" has the same meaning as in clause 42(2)(a) of Ontario Regulation 140/02, the *Oak Ridges Moraine Conservation Plan* Regulation;

"vegetated buffer zone" means an area that,

(a) has a width of at least 3 metres, adjacent to surface water, measured from the top of the bank of the surface water nearest the buffer zone; and

(b) is maintained under continuous vegetated cover, including perennial grasses, forbs or trees and perennial forage crops that are harvested as hay or silage;

"well" includes a gas well, oil well, unused well, test well and water well.

(2) In the Act,

"generator" means generator as defined by subsection (1).

(3) In this Regulation, a reference to a nutrient includes a reference to material that contains the nutrient.

(4) In this Regulation, a reference to a measurement within a range between two stated measurements shall be taken to be a reference to any measurement that is equal to or greater than the first measurement in the range and less than the second measurement (for example, a reference to a measurement within the range 15 centimetres to 30 centimetres shall be taken to be a reference to any measurement equal to or greater than 15 centimetres and less than 30 centimetres).

Meaning of "surface water"

1.2 (1) In this Regulation,

"surface water" means, subject to subsection (2),

(a) a natural or artificial channel that carries water continuously throughout the year, or intermittently, and has established vegetation within the bed of the channel not dominated by terrestial plants,

(b) a lake, reservoir, pond or sinkhole,

(c) a wetland as defined in Ontario Regulation 140/02 made under the *Oak Ridges Moraine Conservation Act, 2001*, or

(2) The following are not surface water for the purposes of this Regulation:

1. Grassed waterways.
2. Temporary channels for surface drainage, such as furrows or shallow channels that can be tilled and driven through.
3. Rock chutes and spillways.
4. Roadside ditches that do not contain a continuous or intermittent stream.
5. Temporarily ponded areas that are normally farmed.
6. Artificial or constructed waterbody intended for the storage, treatment or recirculation of those agricultural source materials set out in paragraphs 2 to 7 of Section **1.6**.

INCORPORATED DOCUMENTS

Availability of Nutrient Management Protocol and other incorporated documents

1.3 (1) The Director shall ensure that copies of any document, including the Nutrient Management Protocol, incorporated by this Regulation as the document may be amended from time to time after this Regulation is made, incorporating any such amendments, are made available to the public by,

(a) posting on a website maintained by the Ministry and notified in the registry under the *Environmental Bill of Rights, 1993*; or

(b) any other print or electronic medium of mass communication.

(2) Subsection (1) does not apply to an Act or Regulation of Ontario or Canada.

FARM UNITS

What constitutes a farm unit

1.4 (1) An area of land used for an agricultural operation, part of an agricultural operation or more than one agricultural operation constitutes a single farm unit for the

purposes of this Regulation only if the following rules apply:

1. It must be reasonably necessary, for the avoidance of any adverse effect described in subsection 18 (3) of the Act, for any prescribed materials generated on the land, or any nutrients applied on the land, to be managed by reference to a single nutrient management strategy or plan.

2. For a single farm unit on which prescribed materials are generated, all land on the farm unit must be constituted by a complete portion or complete portions of land each of which was, when acquired by its current owner, conveyed under a single transfer as defined in the *Land Registration Reform Act.*

3. A farm unit on which prescribed materials are generated must include all land on which the generated material is applied or stored, unless the nutrient management strategy or plan for the farm unit provides for the generated material to be transferred elsewhere, in accordance with this Regulation,

   (i) under a broker agreement,

   (ii) through intermediate generators,

   (iii) by a farm unit transfer, or

   (iv) for use other than as a nutrient.

4. A farm unit on which nutrients are applied, but prescribed materials are not generated, must be no smaller than a single field.

5. If a greenhouse is part of the agricultural operation or operations, and the greenhouse covers more than 200 square metres of land under a single roof, there must be no more than a single farm unit including the land covered by the greenhouse.

6. If a container nursery is part of the agricultural operation or operations, and the nursery covers more than 200 square metres of land, there must be no more than a single farm unit including the land covered by the nursery.

7. A part of a farm unit on which manure is generated may be located at any distance from a part of the farm unit where the manure is applied to land.

(2) If a person owns or controls land in relation to which a nutrient management strategy or plan has been or is being prepared, the Director may, on application by the person or on the Director's own initiative, by certificate given to the person, designate

land described in the certificate as a farm unit for the purposes of the strategy or plan, regardless of whether the person owns or controls all or part of the designated land.

(3) The Director shall have regard to the rules described in subsection (1) in making a decision to designate land as a farm unit.

Farm units, categories

1.5 (1) For the purposes of this Regulation, a farm unit has the category set out in the following table in the circumstances shown in the table:

Category of farm unit or operation	**Circumstances**[1]
Category 1 farm unit	Fewer than 30 nutrient units (annual maximum)
Category 2 farm unit	30 to 150 nutrient units (annual maximum)
Category 3 farm unit	150 to 300 nutrient units (annual maximum)
Category 4 farm unit	300 or more nutrient units (annual maximum)

[1]Note: "30 to 150" nutrient units means equal to or more than 30 nutrient units and fewer than (but not equal to) 150 nutrient units, and the range "150 to 300" nutrient units applies in the same way (see s. 1.1 (4)).

(2) If this Regulation refers to a category of farm unit in relation to the generation of prescribed materials at the farm unit, the second column of the table in subsection (1) describes the maximum number of nutrient units that is capable of being generated annually at the farm unit.

(3) If this Regulation refers to a category of farm unit in relation to the receipt of nutrients at the farm unit, the second column of the table in subsection (1) describes the maximum number of nutrient units that may reasonably be expected to be received annually at the farm unit.

Further categories of farm unit and operation

(4) The following table sets out further catagories of farm unit and operation for the purposes of this regulation.

Category of farm unit or operation	**Circumstances**
Category 5 Greenhouse and Container Nurseries	A farm unit or operation which is capable of generating or receiving greenhouse and container nursery leachate
Category 6 Non-Agricultural Source Material Generators and Users	A farm unit or operation which is capable of generating or receiving a non-agricultural source materials set out in Paragraphs 1 – 4 of section 1.7 (1)
Category 7 Miscellaneous Agricultural Sources Material Sources and Users	A farm unit or operation that is capable of generating or receiving an agricultural source materials as set out in paragraph 2-5 of section 1.6.(1)
Category 8 Commercial Fertilizer Users	a farm unit which land applies only commercial fertilizers
Category 9 Intermediate Operations	an intermediate operation

PRESCRIBED MATERIALS

Prescribed materials, agricultural source material

1.6 (1) The following agricultural source materials are prescribed materials for the purposes of this Regulation, if they are capable of being applied to land as nutrients:

1. Manure produced by farm animals, including associated bedding materials.

2. Washwaters from agricultural operations that has not been mixed with human waste.

3. By-products of on-farm processes, including non-chemically and non-thermally altered by-products of fruit and vegetable processing.

4. Leachates from on-farm feed storages.

5. Runoff from farm-animal yards and manure storages.

6. Greenhouse and container nursery leachate.

7. Organic materials produced by intermediate generators (for example, mushroom compost) that contain no materials except other agricultural source materials described in this subsection.

8. Any other material from an agricultural source that is capable of being applied to land as a nutrient.

(2) Despite subsection (1), a commercial fertilizer that is produced, marketed and used in accordance with the *Fertilizers Act* (Canada) is not a prescribed material for the purposes of this Regulation.

Prescribed materials, non-agricultural source material

1.7 (1) The following non-agricultural source materials are prescribed materials for the purposes of this Regulation if they are capable of being applied to land as nutrients:

1. Pulp and paper biosolids.

2. Organic materials produced by intermediate generators (for example, yard waste compost) that contain materials other than agricultural source materials.

3. Sewage biosolids (for example, sewage sludge including treated septage pumped out from septic tanks).

4. Any other material that is not from an agricultural source that is capable of being applied to land as a nutrient.

(2) Despite subsection (1), a commercial fertilizer that is produced, marketed and used in accordance with the *Fertilizers Act* (Canada) is not a prescribed material for the purposes of this Regulation.

FARM ANIMAL NUMBERS

No restriction on farm animal numbers

1.8 For the purposes of the Act and this Regulation, there shall be no restriction on the numbers of farm animals that may be managed in the course of an agricultural operation, unless imposed expressly or by implication by this Regulation or by an order under section 29 or 30 of the Act.

PART II
STRATEGIES AND PLANS: GENERAL

COMPLIANCE WITH STRATEGY OR PLAN

Management of prescribed materials in accordance with compliant strategy

2.1 (1) This section applies if there is a compliant nutrient management strategy in relation to an agricultural operation or a non-farm operation.

(2) The person who owns or controls the operation shall ensure that prescribed materials generated or received in the course of the operation are managed in accordance with the strategy.

(3) No person shall manage prescribed materials that are generated in the course of the operation except in accordance with the strategy.

Nutrient management in accordance with compliant plan

2.2 (1) This section applies if there is a compliant nutrient management plan in relation to the application of nutrients to land.

(2) The person who owns or controls the land shall ensure that nutrients received, stored or applied on the land are managed in accordance with the plan.

(3) No person shall manage nutrients that are received, stored or applied on the land except in accordance with the plan.

WHEN A STRATEGY IS REQUIRED

Requirement for nutrient management strategy

2.3 (1) A person who owns or controls an agricultural operation that is carried out on a farm unit not referred to in subsection (2) and is a farm unit that generates prescribed materials shall ensure that there is in force a compliant nutrient management strategy for the farm unit.

(2) A person who owns or controls an agricultural operation that is carried out on any of the following farm units shall ensure that there is in force a nutrient management strategy for the farm unit that is approved under this Regulation:

(a) A category 3 or 4 farm unit.

Category 5 Farm Unit

(b) A farm unit which generates greenhouse or container nursery leachate, if the total area of land covered by all greenhouses and container nurseries on the unit is three hectares or more.

Category 7 Farm Unit

3. A farm unit on which is produced annually,

i. over six million litres of washwater that includes no manure or associated bedding materials,

ii. over 500 tonnes of vegetable culls, other than fruit culls, or

iii. over 1100 tonnes of fruit culls.

Category 6 Operation

(3) A person who owns or controls a non-farm operation that generates prescribed materials that are intended to be applied to land, other than an intermediate operation, shall ensure that there is in force a nutrient management strategy for the operation that is approved under this Regulation.

Category 9 Operation

(4) A person who owns or controls an intermediate operation shall ensure that there is in force for the operation,

(a) a compliant nutrient management strategy, if the operation receives fewer than 300 nutrient units annually, or

(b) a nutrient management strategy that is approved under this Regulation, if the operation receives 300 nutrient units or more annually.

Category 1-4 Generation of manure, phasing-in for strategies

2.4 (1) **Subsection 2.3 (1) or (2)** applies in relation to the generation on a farm unit of manure produced by farm animals, including associated bedding materials, after the earliest of whichever of the dates in the following table is applicable:

Item	Category or type of farm unit	Farm unit generation capacity (see section 1.5)[1]	Date on which subsection 2.3 (1) or (2) applies
1.	Farm unit on which there is a new or expanding farm-animal agricultural operation	(see subsection (3))	March 31, 2003
2.	Category 4 farm unit	300 or more nutrient units (annual maximum)	March 31, 2004
3.	Category 3 farm unit	150 to 300 nutrient units (annual maximum)	March 31, 2005
4.	Category 2 farm unit	30 to 150 nutrient units (annual maximum)	March 31, 2005
5.	Category 1 farm unit	Fewer than 30 nutrient units (annual maximum)	March 31, 2008

[1]Note: "150 to 300" nutrient units means equal to or more than 150 nutrient units and fewer than (but not equal to) 300 nutrient units, and the range "30 to 150" nutrient units applies in the same way (see s. 1.1 (4)).

(2) Item 1 in the table does not apply to a farm unit on which there is a new or expanding farm-animal operation if,

(a) on or before March 31, 2003, a building permit under the *Building Code Act, 1992* had been obtained for the construction or expansion on the farm unit of facilities to house farm animals or store prescribed materials; and

(b) immediately before March 31, 2003, there was no further construction or expansion of such facilities proposed for which such a building permit had not been obtained.

(3) In this section,

"new or expanding farm-animal operation" means an agricultural operation,

(a) that involves the growing, production or raising of farm animals; and

(b) that, on **[insert date of filing of this Regulation]**,

(i) did not involve the growing, production or raising of farm animals; or

(ii) was in a lower category of farm unit than on March 31, 2003 (for example, a farm unit that, on **[insert date of filing of this**

Regulation], was a category 1 farm unit that is a category 2 farm unit on March 31, 2003).

Category 5 Greenhouse and nursery leachate generation, phasing-in for strategies

2.5 (1) **Subsection 2.3 (1) or (2)** applies after whichever of the following dates is applicable in relation to the generation of greenhouse or container nursery leachate in the course of an agricultural operation:

(a) for a new or expanding greenhouse or nursery operation, March 31, 2006;

(b) in any other case, March 31, 2008.

(2) Clause (1) (a) does not apply if,

(a) on or before March 31, 2006, a building permit under the *Building Code Act, 1992* had been obtained for the construction or expansion of facilities for use in the course of the operation; and

(b) immediately before March 31, 2006, there was no further construction or expansion of such facilities proposed for which such a building permit had not been obtained.

(3) In this section,

"new or expanding greenhouse or nursery operation" means an agricultural operation in the course of which greenhouse or nursery leachate is generated that,

(a) on **[insert date of filing of this Regulation]** did not involve the generation of greenhouse or nursery leachate; or

(b) since that date has been expanded by the construction or expansion of new facilities for use in the course of the operation.

Category 7 Non-manure agricultural source material generation, phasing-in for strategies

2.6 Subsection 2.3 (1) or (2) applies after March 31, 2007 in relation to the generation of agricultural source materials, other than manure produced by farm animals including associated bedding materials, in the course of an agricultural operation.

Category 6 Sewage processors, phasing-in for strategies

2.7 (1) **Subsection 2.3 (3)** applies after the date shown in the following table in relation to the generation of prescribed materials at a sewage processor described in the table:

Item	Type of sewage processor	Maximum daily rate of generation of prescribed materials[1]	Date on which subsection 2.3 (3) applies
1.	Type 1 sewage processor	More than 45,400 cubic metres (m^3)	September 30, 2003
2.	Type 2 sewage processor	22,700 to 45,400 m^3	September 30, 2004
3.	Type 3 sewage processor	7,000 to 22,700 m^3	March 31, 2006
4.	Type 4 sewage processor	4,545 to 7,000 m^3	September 30, 2006
5.	Type 5 sewage processor	2000 to 4,545 m^3	March 31, 2007
6.	Type 6 sewage processor	920 to 2000 m^3	September 30, 2007
7.	Type 7 sewage processor	Less than 920 m^3	March 31, 2008

[1]Note: "22,700 to 45,400" cubic metres means equal to or more than 22,700 m^3 and less than (but not equal to) 45,400 m^3, and the other ranges in this column apply in the same way (see s. 1.1 (4)).

(2) In this section,

"sewage processor" means a non-farm operation consisting of sewage works as defined in the *Ontario Water Resources Act* for which an approval has been given under section 53 of that Act authorizing,

(a) the treatment of sewage for a municipality; or

(b) the generation of prescribed materials.

Category 6 Non-farm operations other than intermediate operations, phasing-in for strategies

2.8 Subsection 2.3 (3) applies after the date shown in the following table in relation to the generation of prescribed materials in the course of a non-farm operation described in the table:

Item	Type of non-farm operation	Date on which subsection 2.3 (3) applies
1.	Paper production Pulp and paper production	September 30, 2004
2.	Abbatoir Cheese production Other dairy food production Egg production Poultry production	March 31, 2005
3.	Animal feed production Brewery Meat production other than poultry Pet food production Power generation Recycling Slag/liming Tannery Wood processing Any industrial or other non-farm operation not otherwise described in this section or section 2.7 or 2.9	September 30, 2005

Category 9 Intermediate operations, phasing-in for strategies

2.9 Subsection 2.3 (4) applies in relation to the generation of a particular prescribed material in the course of an intermediate operation after the earliest of the following dates:

1. The date this Part requires a compliant nutrient management strategy or plan to be obtained for a farm unit or a non-farm operation in relation to the prescribed material in the form in which it is received from that farm unit or operation for processing in the course of the intermediate operation.

2. The date this Part requires a compliant nutrient management strategy or plan to be obtained for a farm unit or a non-farm operation in relation to the prescribed material in the form in which it is transferred to that farm unit or operation after processing in the course of the intermediate operation.

3. March 31, 2008.

WHEN A PLAN IS REQUIRED

Requirement for nutrient management plan, farm units

2.10 (1) Subject to subsection (4), a person who owns or controls an agricultural operation carried out on a category 1 or 2 farm unit in the course of which nutrient is applied to land shall ensure that there is in force a compliant nutrient management plan for the farm unit.

(2) A person who owns or controls an agricultural operation carried out on a category 3 or 4 farm unit in the course of which nutrient is applied to land shall ensure that there is in force a nutrient management plan for the farm unit that is approved under this Regulation.

Category 8

(3) A person who owns or controls an agricultural operation in the course of which the only nutrient that is applied to land is commercial fertilizer shall ensure that there is in force a nutrient management plan for the farm unit that is approved under this Regulation if the fertilizer is applied within the two-year time of travel zone of a well that is used for a municipal water supply.

(4) A person referred to in subsection (1) or (2) who applies non-agricultural source materials shall ensure that there is in force a nutrient management plan for the farm unit that is approved under this Regulation.

(5) A person who owns or controls an agricultural operation carried out on a Category 1,2,3 or 4 farm unit who applies liquid manure from any source shall ensure that there is in force a compliant nutrient management plan for the farm unit on which the material is applied no later than the earlier of the date that;

(a) the generator of the liquid manure is required to complete their nutrient management strategy; or

(b) they are required to complete a nutrient management plan in accordance with section 2.11

(6) Subsection (5) does not apply to a person who owns or controls an agricultural operation carried out on a Category 1 farm unit who applies liquid manure only from that farm unit.

Farm unit nutrient application, additional phasing-in

2.11 (1) **Section 2.10** applies in relation to the application of nutrients to land on a farm unit after the earliest of whichever of the dates in the following table is applicable:

Item	Category or type of farm unit	Nutrient units reasonably expected to be received (see section 1.5)[1]	Date on which section. 2.10 applies
1.	Farm unit on which there is a new or expanding nutrient storage facility	(see subsection (2))	March 31, 2003
2.	Category 4 farm unit	300 or more nutrient units (annual maximum)	March 31, 2004
3.	Category 3 farm unit	150 to 300 nutirent units (annual maximum)	March 31, 2005
4.	Category 2 farm unit	30 to 150 nutrient units (annual maximum)	March 31, 2005
5.	Category 1 farm unit	Fewer than 30 nutrient units (annual maximum)	March 31, 2008

[1]Note: "150 to 300" nutrient units means equal to or more than 150 nutrient units and fewer than (but not equal to) 300 nutrient units, and the range "30 to 150" nutrient units applies in the same way (see s. 1.1 (4)).

(2) In this section,

"new or expanding nutrient storage facility" means a nutrient storage facility that is constructed or expanded since **[insert date of filing of this Regulation]**, unless,

(a) on or before that date, a building permit under the *Building Code Act, 1992* had been obtained for the construction or expansion of the facility; and

(a) immediately before that date, there was no further construction or expansion proposed for which such a building permit had not been obtained.

(3) A farm unit which is not otherwise required to have a compliant nutrient management plan and which recieves nutrients from a new or expanding Category 5 **[green houses and container nurseries]** operation shall ensure that there is a compliant nutrient management plan in force no later than March 31, 2006.

(4) A farm unit which is not otherwise required to have a compliant nutrient management plan and which recieves nutrients from an existing Category 5 **[green houses and container nurseries]** operation shall ensure that there is a compliant nutrient management plan in force no later than March 31, 2008.

(5) A farm unit which is not otherwise required to have a compliant nutrient management plan and which recieves nutrients from a Category 7 operation **[miscellaneous agricultural source material]**shall ensure that there is a compliant nutrient management plan in force no later than March 31, 2007.

(6) A Category 8 farm unit **[commercial fertilizers]** which is not otherwise required to have a compliant nutrient management plan shall ensure that there is a compliant nutrient management plan in force no later than March 31, 2008.

(7) A farm unit which is not otherwise required to have a compliant nutrient management plan and which recieves nutrients from a Category 6 operation **(non-agricultural Source materials)**shall ensure that there is a compliant nutrient management plan in force no later than March 31, 2008.

INSPECTION REQUIREMENTS

Inspection of nutrient management strategies, plans and site characterizations

2.12 (1) This section applies if a nutrient management strategy or plan, or a site characterization, is or has been in use in relation to a farm unit or a non-farm operation.

(2) A person who owns or controls an agricultural operation that is carried out on the farm unit, or the non-farm operation shall, until two years after the nutrient management strategy plan, or site characterization, ceases to be in force under this Regulation,

(a) keep a copy of the strategy, plan, or site characterization, incorporating any amendments as they are made, at the site of the operation; and

(b) make the copy available for inspection by a provincial officer at the request of the officer.

SHORT-FORM STRATEGIES OR PLANS

Short-form strategies and plans, when allowed

2.13 (1) This section applies in relation to the following agricultural operations:

1. An operation that is carried out on a category 1 or 2 farm unit.

2. An operation in the course of which the only nutrients generated or applied to land are any or all of the following:

   i. agricultural source materials described in **paragraphs 2 to 6 of subsection 1.6 (1).**

   ii. commercial fertilizers produced, marketed and used in accordance with the *Fertilizers Act* (Canada).

(2) If a person who owns or controls the operation is required by this Regulation to ensure that there is in force a compliant nutrient management strategy or plan for the farm unit or operation, the person may fulfil the requirement by ensuring that a short-form nutrient management strategy or plan is in force for the farm unit or operation.

(3) A short-form nutrient management strategy or plan shall be in the form set out in the Nutrient Management Protocol.

(4) The Nutrient Management Protocol may specify information otherwise required by **section 3.1 (3) (Contents of strategies)** or **3.7 (3) (Contents of plans)** that may be omitted from a short-form nutrient management strategy or plan, or that may be presented in a different form in such a short-form strategy or plan.

(5) In this Regulation, a reference to a nutrient management strategy or plan includes a reference to a short-form nutrient management strategy or plan, as the case may be, prepared in accordance with this section.

PART III
STRATEGIES AND PLANS: PREPARATION

NUTRIENT MANAGEMENT STRATEGIES

Contents and preparation

3.1. (1) This section applies to a nutrient management strategy for all prescribed materials, or particular prescribed materials, that are generated or received in the course of any of the following operations:

1. An agricultural operation or operations carried out on a farm unit.

2. A non-farm operation.

(2) A nutrient management strategy for the farm unit or non-farm operation must be prepared by a person licensed to do so under **Part XI (Training & Licensing).**

(3) A nutrient management strategy for the farm unit or non-farm operation must be prepared in a form approved by the Director, and must include the following information in relation to the prescribed materials for which the strategy is prepared:

1. The name of a person who owns or controls each operation in the course of which the materials are generated, or from which the materials are received, together with the operation identifier for each such operation, which may be assigned under subsection (4) if necessary.

2. A description of each operation to which the materials are to be transferred, if they are not to be applied to land as nutrient in the course of the operation for which the strategy is prepared, together with the operation identifier for each such operation.which may be assigned under subsection (4) if necessary.

3. A description of storage facilities for the materials that meet the requirements of **Part VIII (Construction Standards)** and of any other facilities used by the operation for storage of nutrients.

4. The location of each nutrient-generating facility and storage site owned or controlled by the person described in paragraph 1 that is used for prescribed materials described in the strategy, together with the operation identifier for the relevant farm unit or non-farm operation, which may be assigned under subsection (4) if necessary.

5. For an agricultural operation, a description of the farm unit.

6. A sketch showing:

    i. The location and boundaries of the farm unit.

    ii. Individual field locations and boundaries.

    iii. The location of known used and unused wells, tile inlets and outlets and surface water.

    iv. The location of farm buildings and nutrient storage facilities.

7. A list of the materials, segregated into liquid and solid materials.

8. An analysis of nutrient content and quality of materials described in **Part IX (Quality standards)** for the purposes of determining compliance with that Part.

9. A description of any prescribed materials not described in **Part IX (Quality standards)** that are dealt with by the nutrient management strategy.

10. Quantities of the materials, determined in accordance with,

    i. in the case of non-farm operation that has a certificate of approval under the *Environmental Protection Act* or an approval under the *Ontario Water Resources Act*, whichever of those Acts applies, or

    ii. for an agricultural operation, or for a non-farm operation not described in subparagraph (i), the relevant formula set out in the Nutrient Management Protocol.

11. Identifying details, including the operation identifier, of any nutrient management plan or any other nutrient management strategy that is relevant to the management of the materials.

12. Contingency plans.

13. In the case of generators of non-agricultural source materials, a compliant nutrient management plan for each application site required to have a nutrient management plan.

(4) On application by the person responsible for the preparation of the nutrient management strategy, the Director shall assign an operation identifier to the following, unless an operation identifier has already been assigned:

1. The farm unit or non-farm operation for which the strategy is prepared.

2. Each farm unit or non-farm operation from which prescribed materials are received.

2. Each farm unit or non-farm operation to which prescribed materials are transferred.

(5) A nutrient management strategy for a farm unit or a non-farm operation in relation to a prescribed material must account for the total quantity of that material suitable for application to land as nutrient which may reasonably be expected to be generated or received at the farm unit, or in the course of the non-farm operation, in each year for which the strategy is prepared.

(6) A nutrient management strategy must be signed by an owner of the operation for which it is prepared or, where the owner is a corporation, an officer of the corporation.

Management of nutrient for non-nutrient purposes

3.2 A nutrient management strategy may provide for some or all of the prescribed materials that are dealt with by the strategy to be managed for non-nutrient purposes.

Export of material outside farm unit or non-farm operation

3.3 (1) This section applies if a nutrient management strategy provides for prescribed materials generated at a farm unit or non-farm operation to be exported elsewhere for management in the course of another operation in Ontario.

(2) The nutrient management strategy must include a written agreement or agreements authorizing the export of the prescribed materials.

(3) The agreement, or all the agreements taken together, must authorize the export of all the prescribed materials that are to be exported while the strategy is in force.

(4) An agreement for the export of nutrient must be,

(a) between each person who owns or controls the operation from which the materials are to be exported, on the one hand, and the person who owns or controls the operation to which the nutrient is to be exported, on the other; and

(b) in a form approved by the Director.

(5) A person who owns or controls land or an operation from which prescribed materials are exported need not have an interest in the land or operation to which the prescribed materials are to be exported.

(6) The nutrient management strategy may include provision for the export of prescribed materials to an operation only if provision is made for the management of the exported materials at the other operation either in that strategy, or in another compliant nutrient management strategy or plan.

(7) Subsection (6) does not apply in relation to the management of a solid prescribed material if this Regulation does not require a compliant nutrient management plan or strategy for the farm unit or non-farm operation to which the material is to be exported.

(8) The place where materials are exported in accordance with this section may be located anywhere without regard to the distance from the farm unit where the materials are generated.

Nutrient management strategies, incorporation of plans and other strategies

3.4 (1) A nutrient management strategy may incorporate another compliant nutrient management strategy or plan, subject to this section.

(2) A nutrient management strategy may incorporate another nutrient management strategy or plan only if,

(a) the incorporating strategy and the other strategy or plan are directly controlled by the same person; or

(b) the other strategy or the plan itself provides for being so incorporated.

(3) If a nutrient management strategy incorporates another nutrient management strategy or plan that is not independently approved or certified under this Regulation, and the incorporating strategy is approved or certified under this Regulation, for the purposes of this Regulation the other strategy or the plan shall be deemed to be approved or certified, as the case requires, by virtue of the approval or certification of the incorporating strategy, while that approval or certification remains in force.

Nutrient management strategies, cessation in force

3.5 A compliant nutrient management strategy ceases to be in force for a farm unit or a non-farm operation at the earliest of the following times:

1. Five years after the strategy came into force, or was approved or certified under this Regulation, whichever is later.

2. The occurrence of any of the following events:

   i. The end of a year in which there is an increase of 20% or more in the quantity of nutrients generated or received at the farm unit or non-farm operation since the first year of operation of the strategy.

   ii. A change of ownership or control of any operation carried out on the farm unit, or of the non-farm operation, which adversely affects the capacity of a person who currently owns or controls such an operation to implement the first strategy.

   iii. A change in the use of nutrients generated on the farm unit or in the course of the non-farm operation (for example, by being processed by an intermediate handler rather than applied to land).

   iv. The end of a year in which there is an increase by 30 nutrient units or more in the quantity of nutrients exported to any single farm unit or non-farm operation since the previous year.

v. The commencement of operation of a new generating facility or nutrient storage facility on the farm unit or for the non-farm operation.

NUTRIENT MANAGEMENT PLANS

Purposes

3.6 A nutrient management plan must give effect to the following purposes:

1. The optimization of the relationship between the land-based application of nutrients, farm management techniques and crop requirements.

2. Land use which maximizes the efficiency of on-site nutrient use.

3. The minimization of adverse environmental impact.

Contents and preparation

3.7 (1) This section applies in relation to any or all nutrients received or applied to land in the course of an agricultural operation or operations carried out on a farm unit.

(2) A nutrient management plan for the farm unit must be prepared by a person licensed to do so under **Part XI (Training & Licensing)**.

(3) A nutrient management plan must must be prepared in a form approved by the Director, and must include the following information:

1. A description of the type of agricultural operation or operations.

2. A description of the farm unit, together with the operation identifier, which may be assigned under subsection (4).

3. A sketch showing:

   i. The location and boundaries of the farm unit.

   ii. Individual field locations and boundaries.

   iii. The location of known used and unused wells, tile inlets and outlets and surface water.

   iv. The location of farm buildings and nutrient storage facilities.

4. Field-by-field details as follows:

   i. The landbase available for nutrients.

   ii. Soil test details.

   iii. Crop rotation plans, yields, crop requirements and removal.

   iv. Nutrient allocation.

   v. Total of nutrient inputs from all defined sources.

   vi. Sufficient information to enable a determination of whether further application limits and separation distances are warranted.

   vii. Sufficient information to determine whether nutrient application rates, methods, timing and incorporation and separation distances comply with this Regulation.

5. A contingency plan.

(4) On application by the person responsible for the preparation of the nutrient management plan, the Director shall assign an operation identifier to the farm unit, unless an operation identifier has already been assigned.

(5) A nutrient management plan for a farm unit in relation to a nutrient must account for the total quantity of that nutrient which may reasonably be expected to be received or applied to land on the farm unit, in each year for which the plan is prepared.

(6) A nutrient management plan may deal with land in separate parts, including parts smaller than fields, if the land or the agricultural operation is not of a uniform character because of the physical nature of the land or the crops to be grown on the land.

Nutrient management plans, cessation in force

3.8 A compliant nutrient management plan ceases to be in force for a farm unit at the earliest of the following times:

1. Five years after the plan came into force, or was approved or certified under this Regulation, whichever is later.

2. The occurrence of any of the following events:

i. The end of a year in which there is an increase of 20% or more in the quantity of prescribed materials received at the farm unit since the first year of operation of the plan.

ii. The end of a year in which, due to a change in the cropping system at the farm unit, there is a decrease of 20% or more in crop removal of nitrogen and phospherus provided by nutrients received at the farm unit since the first year of operation of the plan.

iii. The end of a year in which there is a decrease in land available for the application of prescribed materials on the farm unit of more than 10%, amounting to a decrease of at least 2 hectares, since the first year of operation of the plan.

PART IV
STRATEGIES AND PLANS: APPROVAL AND CERTIFICATION

APPROVAL

Approval by Director

4.1 (1) This section applies if a person who owns or controls an agricultural operation carried out at a farm unit, or a non-farm operation, is required by this Regulation to ensure that there is in force a nutrient management strategy or plan for the farm unit or the non-farm operation that is approved under this Regulation.

(2) The person may submit the strategy or plan to the Director for approval, in the form approved by the Director.

(3) The Director shall,

(a) approve the strategy or plan;

(b) request the provision of further relevant information

(c) refuse to approve the strategy or plan, and request that it be revised and resubmitted in accordance with any directions in the notice.

(d) restrict, amend or modify any activities in the plan or strategy ; or

(e) request an operation to submit annual reports at any time

(4) The Director may approve the nutrient management strategy or plan only if it is prepared in accordance with this Regulation.

Update after 5 years

4.2 (1) This section applies if a nutrient management strategy or plan for which an approval (called in this section "the original approval") has been given is still in force 90 days before the date that is five years after the date the approval was given.

(2) A person who owns or controls an agricultural operation that is carried out at the farm unit, or who owns or controls the non-farm operation, shall submit a new nutrient management strategy or plan for the farm unit or operation to the Director for approval under **section 4.1** at least 90 days before the date that is five years after the date the original approval was given.

(3) If a new nutrient management strategy or plan is submitted to the Director under subsection (2), and the Director does not approve or refuse to approve the new strategy or plan before the date that is five years after the original approval was given, the new strategy or plan, incorporating any later revision requested under **subsection 4.1 (3)**, shall be deemed to be approved from that date until whichever of the following dates is applicable, or the earliest of them:

1. The date the new strategy or plan is actually approved by the Director.

2. The date the Director refuses to approve the new strategy or plan.

3. The date an order is given under section 29 of the Act stating that the new strategy or plan is no longer approved.

4. Where a plan is in effect that has not received final approval the Director may place conditions, restrictions, amendments or modifications to proposed activities in the new plan or strategy.

Update earlier than 5 years

4.3 (1) This section applies if a person who owns or controls an agricultural operation carried out at a farm unit, or a non-farm operation, has reasonable grounds for believing that an approved nutrient management strategy or plan for the farm unit or operation will cease to be in force because of the occurrence of an event described in **paragraph 2 of section 3.5 or 3.8**.

(2) The person shall, without undue delay, and before the occurrence of the event, submit a new nutrient management strategy or plan to the Director for approval under **section 4.1**.

(3) The new nutrient management strategy or plan, incorporating any later revision requested under **subsection 4.1 (2)**, shall be deemed to be approved from the date of the

occurrence of the event until whichever of the following dates is applicable, or the earliest of them:

1. The date the new strategy or plan is actually approved by the Director.

2. The date the Director refuses to approve the new strategy or plan.

3. The date an order is given under section 29 of the Act stating that the new strategy or plan is no longer approved.

Transition, strategies or plans reviewed before **[insert date of filing of this Regulation]**

4.4 (1) This section applies if, before **[insert date of filing of this Regulation]**, the Ministry had issued a notice to a person who owns or controls an operation that a strategy or plan for managing prescribed materials or nutrients generated or received in the course of the operation was satisfactory.

(2) The strategy or plan shall be deemed to be approved under this Regulation as a nutrient management strategy or plan until the earlier of the following dates:

1. The expiry date (if any) specified on the notice.

2. **[insert the date 5 years after the date of filing this Regulation]**.

CERTIFICATION

Certification by accredited certifier

4.5 (1) This section applies if a person who owns or controls an agricultural operation carried out at a farm unit, or a Category 9 non-farm operation, is not required by this Regulation to ensure that there is in force a nutrient management strategy or plan for the farm unit or the non-farm operation that is approved under this Regulation.

(2) An accredited certifier may certify a nutrient management strategy or plan for the farm unit or the non-farm operation if the strategy or plan is prepared,

(a) in the form approved by the Director; and

(b) in accordance with this Regulation.

Update after 5 years

4.6 (1) This section applies if a nutrient management strategy or plan for which a certification (in this section called "the original certification") is still in force 90 days before the date that is five years after the date the certification was given.

(2) A person who owns or controls an agricultural operation that is carried out at the farm unit, or who owns or controls the non-farm operation, may submit a new nutrient management strategy or plan to an accredited certifier for certification under **section 4.5** at least 90 days before the date that is five years after the original certification was given.

(3) If a new nutrient management strategy or plan is submitted to an accredited certifier under subsection (2), and the certifier does not certify the plan before the date that is five years after the original certification was given, the new strategy or plan, incorporating any later revision requested by the certifier, shall be deemed to be certified from that date until whichever of the following dates is applicable, or the earlier of them:

1. The date the strategy or plan is actually certified.

2. The date an order is given under section 29 of the Act stating that the new strategy or plan is no longer certified.

Update earlier than 5 years

4.7. (1) This section applies if a person who owns or controls an agricultural operation carried out at a farm unit has reasonable grounds for believing that a certified nutrient management strategy or plan for the farm unit or operation will cease to be in force because of the occurrence of an event described in **paragraph 2 of section 3.5 or 3.8**.

(2) The person shall, without undue delay, and before the occurrence of the event, submit a new nutrient management strategy or plan to an accredited certifier for certification under **section 4.5**.

(3) The new nutrient management strategy or plan, incorporating any later revision requested by the certifier, shall be deemed to be certified from the date of the occurrence of the event until whichever of the following dates is applicable, or the earlier of them:

1. The date the strategy or plan is actually certified.

2. The date an order is given under section 29 of the Act stating that the new strategy or plan is no longer certified.

CERTIFICATE OF OPERATION

Certificate of operation, category 4 farm unit

4.8 (1) On application in accordance with this section by a person who owns or controls an agricultural operation carried out at a category 4 farm unit, the Director shall issue a certificate of operation to each person that carries out an agricultural operation at

the farm unit.

(2) An application must be in the form approved by the Director, and must be accompanied by the following documents:

1. A copy of an approved nutrient management strategy or plan for the farm unit.

2. A copy of an approved site characterization for the farm unit.

(3) A certificate of operation ceases to be in force if the approved nutrient management strategy or plan for the farm unit, or the site characterization for the farm unit, ceases to be in force.

PART V
BROKERS

Requirement for strategy or plan at source or destination

5.1 (1) A broker shall not accept prescribed materials from an operation, or transfer prescribed materials to an operation, if,

(a) the person who owns or controls the operation is required by this Regulation to ensure that there is a compliant nutrient management strategy or plan in relation to the management of the materials; and

(b) there is no such compliant nutrient management strategy or plan.

(2) A broker shall not transfer liquid animal manure to an agricultural operation unless there is a compliant nutrient management plan in relation to the management of liquid animal manure for the farm unit where the operation is carried out.

Arrangements with generators and other sources

5.2 (1) This section applies in relation to prescribed materials received by a broker from a generator or another broker.

(2) The broker shall enter into an agreement in the form specified in the Nutrient Management Protocol with the generator or other broker.

(3) The broker who receives the materials shall record the following information in the form required by the Nutrient Management Protocol:

1. The type and quantity of prescribed materials received, and the date of receipt.

2. A description of the operation in the course of which the materials were generated.

3. The operation identifier for the operation in the course of which the materials were generated, or for the farm unit where the operation is carried out, and if applicable, the approval number assigned by the Director to the nutrient management strategy for that operation or farm unit.

(4) If a broker receives prescribed material from an intermediate generator, this section applies as if the material were generated exclusively by the intermediate generator.

(5) The broker shall retain the record required by this section for four years after the date on which the prescribed materials are received.

Arrangements with receivers

5.3 (1) This section applies in relation to prescribed materials transferred by a broker to an agricultural or a non-farm operation.

(2) The broker shall enter into an agreement in the form specified in the Nutrient Management Protocol with the person who owns or controls the operation.

(3) The broker shall record the following information in the form required by the Nutrient Management Protocol:

1. The type and quantity of prescribed materials transferred, and the date of transfer.

2. A description of the operation to which the materials are transferred.

3. If applicable, the operation identifier for the operation, or for the farm unit where the operation is carried out, and the approval number if one is assigned by the Director to the nutrient management strategy or plan for the farm unit or operation.

(5) The broker shall retain the record required by this section for four years after the date on which the prescribed materials are transferred.

Management of prescribed materials

5.4 (1) A broker shall ensure that prescribed materials are stored, transported and otherwise managed in the course of the broking operation in accordance with this Regulation.

(2) No person shall store, apply, transport or otherwise manage prescribed materials in the course of a broking operation except in accordance with this Regulation.

PART VI
LAND APPLICATION STANDARDS

GENERAL RESPONSIBILITY

Person who owns or controls agricultural operation

6.1 The person who owns or controls an agricultural operation shall ensure that the requirements of this Part are met in relation to the operation.

LIQUID PRESCRIBED MATERIAL

6.2 Section left blank

Liquid prescribed material, application rates

6.3 (1) No person shall apply liquid prescribed material to land,

(a) if application is not allowed under Table 1 to this section; or

(b) at a rate in excess of that determined under Table 2 to this section.

(c) where the field slope is greater than 12%

(2) For the purposes of Table 1, the soil hydrological group is as determined in accordance with *Ontario Ministry of Agriculture and Food Ontario Drainage Guide*, as it may be amended from time to time.

(3) For the purposes of the first column in Table 2, runoff potential is as determined under Table 1.

Table 1

Runoff Potential

Soil hydrologic group (see *Ontario Ministry of Agriculture and Food Ontario Drainage Guide*)	Runoff potential for Table 2 (or application prohibition) Maximum sustained field slope within 150 metres of watercourse[1]			
	less than 3 %	3 to 6 %	6 to 9 %	9 % or more
A Rapid	Very Low	Very Low	Low	High
B Moderate	Very Low	Low	Moderate	High
C Slow	Low	Moderate	High	No application allowed.
D Very Slow	Moderate	High	High	No application allowed.

[1]Note: "3 to 6%" slope means equal to or more than 3% and less than (but not equal to) 6%, and the range "6 to 9%" applies in the same way (see s. 1.1 (4)).

Table 2

Single Application Liquid Prescribed Material Loading Limit

Runoff potential (see Table 1)	Maximum rate if applied to surface	Maximum rate if injected, incorporated[1] or pretilled[2]
High	50 cubic metres per hectare (m^3/ha)	75 m^3/ha
Moderate	75 m^3/ha	100 m^3/ha
Low	100 m^3/ha	130 m^3/ha
Very Low	130 m^3/ha	150 m^3/ha

[1] Incorporation must occur within 24 hours after manure application.
[2] The land on which the nutrient is applied must have been tilled within the period of 7 days before application.

TILE DRAINAGE

Prevention of preferential flows

6.4 (1) This section applies to land with tile drainage.

(2) A person who applies a liquid prescribed material or non-agricultural source material to the land shall, while applying the nutrient, monitor the tile drainage system, or cause it to be monitored by another person, if it is possible to do so.

(3) If it is not possible for anyone to monitor the tile drainage system, no person shall apply a liquid prescribed material or non-agricultural source material to the land unless,

(a) the land has been tilled within the period of seven days before the application; or

(b) the rate of application is less than 40 cubic metres per hectare.

(4) If there is a compliant nutrient management plan for the land, and any person observes the presence of a liquid prescribed material or non-agricultural source material in the tile drainage system while such a material is being applied to the land,

(a) if that person is not the person applying the material, that person shall immediately inform the person who is applying the material; and

(b) the person applying the material shall immediately implement the contingency plan in the nutrient management plan.

(5) In this section, a reference to the monitoring of the application of a liquid prescribed material or non-agricultural source material to land with tile drainage shall be taken to be a reference to the observation of material discharging from the system,

(a) not more than 20 minutes after the start of the application;

(b) at least hourly after the first observation; and

(c) immediately after completion of the application.

Tile drainage system construction

6.5 (1) No person shall apply liquid manure or non-agricultural source material to land with tile drainage unless the tile drainage system is constructed to enable,

(a) monitoring, as defined in **section 6.4 (Prevention of preferential flows etc.)**, of the contents of the system on a field-by-field basis; and

(b) isolation of a contaminated portion of the system to facilitate the implementation of any applicable contingency plan.

(2) This section does not apply to a tile drainage system constructed before **[insert date of filing of this Regulation]**.

WELLS AND OTHER LAND USES

Set-backs from wells

6.6 No person shall apply nutrients to land in contravention of the following rules:

1. Prescribed materials must not be applied to land closer than 15 metres to a well, with a watertight casing to a depth of at least six metres, below ground level.

2. Agricultural source materials must not be applied to land closer than 30 metres to a well other than a well described in paragraph 1.

3. Non-agricultural source materials must not be applied to land closer than 90 metres to a well without a watertight casing to a depth of six metres below ground level.

4. Commerical fertilizer must not be applied to land closer than three metres to a well.

5. Nutrients must not be applied to land closer than 100 metres to a well that supplies water to a municipal water works.

6. Nutrients that contain nitrogen must not be applied to land within the two-year time of travel zone of a well that supplies water to a municipal water works unless the amount of nitrogen is no greater than the amount that could be applied under the Nutrient Management Protocol for the hydrologic soil group that is in a category one number higher than the number of the category

determined in accordance with **Table 1 to section 6.3 (Liquid prescribed materials, application rates).**

7. Liquid prescribed materials must not be applied to land within the two-year time of travel zone of a well that supplies water to a municipal water works unless,

   (i) the land has been tilled within the period of seven days before the application, and

   (ii) the rate of application of the material is less than 40 cubic metres per hectare.

8. Non-agricultural source materials must not be applied to land within the two-year time of travel zone of a well that supplies water to a municipal water works.

Set-backs from residences and designated health or educational facilities

6.7 No person shall apply prescribed materials as nutrients to land closer than,

(a) 25 metres to the nearest wall of a residential building not in a residential area;

(b) 50 metres to the nearest wall of a residential building in a residential area in which there are four or more residential buildings on adjacent lots of not more than one hectare; and

(c) 50 metres to the property line of a designated health or educational facility.

ADJACENT SURFACE WATER

Requirement for vegetated buffer zone

6.8 (1) No person shall, in the course of an agricultural operation, apply nutrients to a field that contains or is adjacent to surface water unless there is a vegetated buffer zone in the field and adjacent to the surface water.

(2) This section does not apply in relation to the application of nutrients to a field on a farm unit until the person who owns or controls the agricultural operation is required to ensure that there is in force a compliant nutrient management plan governing that application.

Application of nutrients, vegetated buffer zone

6.9 (1) This section applies in relation to the application of nutrients in a field that contains or is adjacent to surface water if there is a vegetated buffer zone in the field that

is,

(a) adjacent to the surface water; and

(b) between the surface water and where the nutrients are applied.

(2) No person shall apply nutrients within the vegetated buffer zone except for the purpose of applying commercial fertilizer to establish the vegetation of the buffer zone.

(3) No person shall apply materials containing nitrogen or phosphorous in the field within 13 metres from the top of the nearest bank of the surface water.

(4) Despite subsection (3), commercial fertilizers and agricultural source material may be applied within the 13 metres from the top of the nearest bank of the surface water if they are applied in accordance with the other provisions of this Regulation, and

(a) by injection or placement in a band below the soil surface; or

(b) so as to be incorporated within 24 hours of application.

(c) to land covered with a living crop

Application of nutrients, no vegetated buffer zone requirement

6.10 (1) This section applies in relation to the application, in the course of an agricultural operation, of nutrients in a field that contains or is adjacent to surface water if,

(a) there is no vegetated buffer zone in the field and adjacent to the surface water; and

(b) the person who owns or controls the agricultural operation is not required to ensure that there is in force a compliant nutrient management plan governing that application.

(2) No person shall apply a non-agricultural source material, or a liquid agricultural source material, in the field closer than 20 metres from the top of the nearest bank of the surface water.

(3) No person shall apply a solid agricultural source material in the field closer than 10 metres from the top of the nearest bank of the surface water.

BEDROCK AND GROUND WATER

Minimum depth to bedrock

6.11 (1) No person shall apply a non-agricultural source material to land where there is less than 1.5 metres of soil over bedrock, unless the application is approved by the Director, taking into consideration the need to avoid any adverse effect described in subsection 18 (3) of the Act that may result from any of the following:

1. The concentration of any constituents of the material.

2. The proposed application rate of the material.

3. The site characteristics of the land where the material is to be applied.

(2) No person shall apply an agricultural source material to land if, where the material is to be applied, the depth of soil over bedrock is less than 1.5 metres, except as allowed (if at all) in accordance with the following table:

Depth of soil over bedrock[1]	**Treated liquid materials, or runoff liquid materials other than untreated liquid manure**	**Solid manure**	**Untreated liquid manure**
Less than 15 centimetres (cm.)	No application allowed.	No application allowed.	No application allowed.
15 to 30 cm.	Application allowed under the following conditions: 1. Land tilled within 7 days before application. 2. Maximum application rate less than 40 cubic metres per hectare (m^3/ha).	Application allowed under the following condition: 1. Maximum application rate less than 45 tonnes per hectare (t/ha).	No application allowed.
30 cm. to 60 cm.	Either, (a) maximum application rate less than 40 m^3/ha; or (b) if land tilled within 7 days before application, maximum application rate less than 75 m^3/ha.	Maximum application rate less than 85 t/ha.	Application allowed under the following conditions: 1. Land tilled within 7 days before application. 2. Maximum application rate less than 40 m^3/ha.
60 cm. to 1.5 metres	No restriction on application unless imposed otherwise by this Regulation, including any restriction in an applicable nutrient management plan.	No restriction on application unless imposed otherwise by this Regulation, including any restriction in an applicable nutrient management plan.	Either, (a) maximum application rate less than 40 m^3/ha; or (b) if land tilled within 7 days before application, maximum application rate less than 75 m^3/ha.

[1]Note: "15 to 30" centimetres means equal to or more than 15 cm. and less than (but not equal to) 30 cm, and the other ranges in this column apply in the same way (see s. 1.1 (4)).

Minimum depth to groundwater

6.12 No person shall apply prescribed material to land unless there is at least,

(a) 90 centimetres of vertical separation between the surface of the ground and a permanent water table, as determined in accordance with the Nutrient Management Protocol; and

(b) 30 centimetres of unsaturated soil condition at the surface of the land.

WINTER APPLICATION

Winter application, December 1 to March 31

6.13. Nutrients must not be applied on fields that have snow-covered soil or frozen soil.

6.13.1 During the period starting on December 1 in one year and ending on March 31 in the following year, no person shall apply nutrients to land in contravention of the following rules:

1.. Non-agricultural source material or liquid agricultural source material must not be applied on fields with a maximum sustained slope greater than 3%.

2. Solid manure must not be applied on fields with a maximum sustained slope greater than 6%.

3. No nutrients may be applied on land that is subject to flooding once or more every five years, according to flood plain mapping provided by a municipality or conservation authority.

4. No nutrients may be applied in areas of a field where water collects during a rain storm or thaw and flows directly into surface water.

5. Nutrients must be applied in one of the following ways, in an applicable case:

   i by injection into the soil.

   ii. by incorporation into the soil to a minimum depth of 10 centimetres within six hours of application to the land, or

   iii. by surface application to land that is covered by a living crop.

6. The rate of application of each nutrient must be a maximum of one half of the maximum application rate specified by the Nutrient Management Protocol, unless paragraph 8 applies.

7. If the rate of application of a nutrient exceeds the rate fixed by paragraph 7, the nutrient must not be applied within 20 metres of the top of the nearest bank of any surface water.

NON-AGRICULTURAL SOURCE MATERIAL

Pre-harvest waiting periods

6.14 Within the waiting period determined by the following table, no person shall harvest plant material from a field to which a non-agricultural source material has been applied.

Plant material harvested	Waiting period
Commercial sod	12 months before harvest
Hay and haylage	3 weeks before harvest
Tree fruits and grapes	3 months before harvest
Vegetables and small fruits grown above ground (for example, raspberries and sweet corn)	1 month
Vegetables and small fruits grown on ground (for example, strawberries and squash)	14 months
Vegetables and small fruits grown below ground (for example, potatoes and beets)	36 months

Pre-grazing waiting period

6.15 Within the waiting period determined by the following table, no person shall cause or permit an animal to graze in a field to which a non-agricultural source material has been applied:

Grazing animal	Waiting period
Horses, beef or dairy cattle	2 months before grazing
Swine, sheep or goats	6 months before grazing

No application to lawns, golf courses, recreational areas, tobacco crops

6.16 No person shall apply non-agricultural source material to any of the following:

1. A lawn.

2. A golf course.

3. Any other recreational area.

4. Land on which tobacco is grown.

5. Any land where the soil test for plant available phosphorus, as described in the applicable ministry protocol, exceeds 60 milligrams of P per liter of soil.

INJECTION AND INCORPORATION OF MANURE AND BIOSOLIDS

Injection and incorporation of manure

6.17 No person shall apply manure to land other than,

(a) by injection; or

(b) by incorporation into the land within the period determined in accordance with the Nutrient Management Protocol by reference to the following,

i. the distance of the application from the nearest wall of a residence (by reference to whether the residence is within or outside a residential area), or the property line of a designated health or educational facility.

ii. the odour level of the manure.

Injection and incorporation of biosolids

6.18 (1) No person shall apply biosolids to land except,

(a) by injection; or

(b) by incorporation in accordance with this section.

(2) Biosolids may be applied to land by incorporation in accordance with the closer set-back rules if,

(a) they are incorporated within six hours after application; or

(b) they have a low odour potential determined in accordance with the Nutrient Management Protocol, and they are incorporated within 24 hours after application.

(3) Biosolids may be applied to land by incorporation in accordance with the more distant set-back rules, if

(a) they are incorporated within 24 hours after application;

(b) they have a low odour potential determined in accordance with the Nutrient Management Protocol; or

(c) they are applied for the purposes of silviculture or land reclamation.

(4) In this section,

"closer set-back rules", in relation to the application of biosolids by incorporation, means application no closer than,

(a) 25 metres from the nearest wall of any residential building not in a residential area,

(b) 50 metres from the nearest wall of any residential building in a residential area, and

(c) 50 metres from the property line of any designated health or educational facility;

"more distant set-back rules", in relation to the application of biosolids by incorporation, means application no closer than,

(a) 90 metres from the nearest wall of any residential building not in a residential area,

(b) 450 metres from the nearest wall of any residential building in a residential area, and

(c) 450 metres from the property line of any designated health or educational facility.

HIGH TRAJECTORY AND DIRECT FLOW APPLICATION

High trajectory irrigation guns

6.19 (1) No person shall use a high trajectory irrigation gun capable of spraying liquid more than 10 metres to apply manure or biosolids to land.

(2) This section does not apply to the application of manure that is generated in the course of an agricultural operation on a farm unit until the earlier of the following times:

1. The day the person who owns or controls the operation is required by this Regulation to ensure that there is in force a nutrient management plan for the farm unit.

2. March 31, 2005.

Direct flow application systems

6.20 (1) No person shall apply manure or biosolids directly from a storage facility to land by a direct flow application system unless the system is operated in accordance with this section.

(2) The application system may be operated by two or more operators in voice or electronic contact with each other at all times during the application if,

(a) a first operator has a full view of the area of land to which the manure or biosolids are being applied; and

(b) a second operator is close enough to the system to shut it down within one minute after being advised by the first operator of a defined event.

(3) The application system may be operated by one or more operators if,

(a) one operator has a full view of the area of land to which the manure or biosolids are being applied; and

(b) either,

(i) that operator is close enough to the system to shut it down within one minute after observing a defined event, or

(ii) the application system is linked to a remote control system allowing the operator to shut the application system down within one minute after observing a defined event.

(4) If a remote control system described in subclause (3) (b) (ii) is linked to an application system, the application system must be designed to shut down automatically within one minute after it ceases to receive a signal from the remote control system.

(5) The application system must be designed and operated so that when it is shut off no manure or biosolids continue to flow from the storage facility by siphoning or other means.

(6) In this section,

"defined event" means any of the following events:

1. Manure or biosolids not being delivered to the application part of the system as intended by the person in charge of the operation of the system.

2. Manure or biosolids not being applied in accordance with the nutrient management plan for the land.

3. Application system failure resulting in the escape of manure or biosolids into the natural environment otherwise than as intended by the person in charge of the operation of the system.

PART VII
OUTDOOR FARM-ANIMAL FEEDING OPERATIONS

APPLICATION

Application of Part VII requirements

7.1 (1) This Part, subject to subsections (2) and (3), applies in relation to an outdoor confinement area used in the course of an agricultural operation that is carried out on a farm unit on and from the date on which a person who owns or controls the operation is required by this Regulation to ensure that there is in force a compliant nutrient management strategy for the farm unit.

(2) **Sections 7.3 (New structures and paving), 7.5 (Livestock on frozen water), 7.6 (Contaminated snow, spreading on fields) and 7.15 (Permanent outdoor confinement areas, manure)** apply on and from **[insert date of filing of the Regulation]**.

(3) If an outdoor confinement area is used in the course of an agricultural operation, a person who owns or controls the operation shall ensure that the requirements of the sections described in subsection (2) are complied with in relation to the area on and from **[insert date of filing of the Regulation]**.

GENERAL REQUIREMENTS

Person who owns or controls agricultural operation

7.2 If an outdoor confinement area is used in the course of an agricultural operation, a person who owns or controls the operation shall ensure that the requirements of this Part are complied with in relation to the area.

Set-backs for new structures and paving

7.3 New structures or paving for an outdoor confinement area must not be constructed within the minimum setback distances provided in **Part VIII (Construction Standards)**, unless the Director authorizes otherwise having regard to the effect on the natural environment of the proposed new structure or paving.

Nutrient management strategy required

7.4 No person shall keep livestock in an outdoor confinement area unless,

(a) there is a compliant nutrient management strategy that applies to the area; and

(b) the livestock are kept in the confinement area, and manure from the livestock is managed, in accordance with the strategy.

Keeping livestock on frozen surface water

7.5 No person shall allow livestock in an outdoor confinement area to tread on any frozen surface water in the area.

Contaminated snow, spreading on fields

7.6 If snow contaminated by manure is removed from an outdoor confinement area, no person shall spread the contaminated snow on a field unless,

(a) there is in force a compliant nutrient management plan that applies to nutrients generated in the confinement area;

(b) the field is designated in the contingency plan included in the nutrient management plan, and application of the contaminated snow in the field is allowed by the contingency plan;

(c) the field has a maximum sustained slope of less than 3%; and

(d) the snow is spread no closer than 40 metres from the top of the nearest bank of surface water, and with four times the minimum setback distances for the application of agricultural source materials to land that are described in **sections 6.6 (set-backs from wells etc.)** and **6.7 (set-backs from residences and health & educational institutions)**.

Contaminated snow, storage and disposal

7.7 (1) If snow contaminated by manure is removed from an outdoor confinement area, no person shall store or dispose of the contaminated snow except in accordance with this section **or section 7.6**.

(2) The contaminated snow may be,

(a) placed in a permanent manure storage facility; and

(b) disposed of in accordance with a compliant nutrient management plan that applies to the confinement area, **subject to section 7.6**.

(3) The contaminated snow may stored in a temporary nutrient storage facility that is established and managed in accordance with Part 11 if,

(a) a contingency plan included in a compliant nutrient management plan that applies to the confinement area so provides;

(b) melt water is collected and treated in a settling basin; and

(c) the treated melt water is passed through an infiltration strip designed by a professional engineer.

SEASONAL OUTDOOR CONFINEMENT AREAS

Seasonal outdoor confinement areas, runoff controls

7.8 (1) No person shall operate a seasonal outdoor confinement area except in accordance with this section.

(2) A seasonal outdoor confinement area must be managed to minimize the runoff of contaminated water from the area.

(3) Without limiting subsection (2), natural or manufactured runoff prevention, treatment and containment systems may be used to minimize the runoff of contaminated water from the confinement area, including the following:

1. Diversion of clean up-slope water away from the confinement area.

2. Use of absorptive bedding materials such as straw, wood shavings and waste hay.

3. Management of the movement of livestock and manure distribution within the confinement area.

4. Runoff collection, storage or treatment systems sufficient to deal with the runoff and meet the standards for manure and runoff storage and treatment specified in **Part XI (Construction Standards)**.

Seasonal outdoor confinement areas, monitoring of tile drains

7.9 A person who manages a seasonal outdoor confinement area on land that is tile-drained shall ensure that,

(a) the tile outlets are monitored to enable any contaminated runoff that reaches the drainage tiles to be contained and recovered; and

(b) any such contaminated runoff is contained and recovered.

Low-density seasonal outdoor confinement areas, manure distribution

7.10 (1) This section applies to a low-density seasonal outdoor confinement area, including any woodlands associated with it.

(2) Subject to subsection (3), a person who manages the area shall ensure that,

(a) there is an even distribution of manure throughout the area;

(b) in particular, that manure is prevented from accumulating around feeding and watering facilities and bedding sites while the area is in use; and

(c) there is a compliant nutrient management plan for the area.

(3) If manure in the confinement area is not evenly distributed throughout the area, a person who manages the confinement area shall ensure that the areas in which manure has accumulated are managed in accordance with the requirements of **sections 7.11 and 7.14** for high-density seasonal outdoor confinement areas.

High-density seasonal confinement areas, livestock density and manure

7.11 A person who manages a high-density seasonal outdoor confinement area on a farm unit shall ensure that,

(a) the number of livestock kept in all such confinement areas on the farm unit is controlled so that the annual maximum amount of nutrient units such livestock would be capable of generating is less than 300 nutrient units;

(b) all accumulated manure is removed from the confinement areas when the seasonal use ends;

(c) such confinement areas are not be located on soils that have rapid filtration rates (Group A) as defined by soil hydrologic group in the Drainage Guide (Ministry of Agriculture and Food publication 29) unless they are paved or have equivalent protection; and

(d) a minimum of 75% vegetative cover is re-established in such confinement areas following the removal of any manure from the surface of the areas after the areas cease to be in use each year and no later than the following August 1st.

(e) Feeding and watering facilities and bedding sites within the area must be set back at least as far from the nearest residential building, and property line of a designated health or educational facility, as is shown in the following table, by reference to the maximum number of nutrient units capable of being generated annually in the area:

Nutrient units in new or expanding high-density seasonal area[1]	**Feeding, watering and bedding—minimum distance from the nearest residential building, and property line of a designated health or educational facility**
Fewer than 30 nutrient units (annual maximum)	75 metres
30 to 150 nutrient units (annual maximum)	125 metres
150 to 300 nutrient units (annual maximum)	175 metres

[1]Note: the range "30 to 150 nutrient units" means equal to or more than 30 nutrient units and less than (but not equal to) 150 nutrient units, and the range "150 to 300 nutrient units" applies in the same way (see s. 1.1 (4)).

(f) Feeding and watering facilities and bedding sites within the area must also be set back by the following minimum distances from particular features:

(i) 15 metres from any drilled well with more than 6 metres of watertight casing;
(ii) 30 metres from any other well, if the other well has not more than 6 metres of watertight casing; and
(iii) a 50 metre flow path to any watercourse or catch basin.

High-density seasonal outdoor confinement areas on natural material, general

7.12 (1) A high-density seasonal outdoor confinement area located wholly or partly on natural material must comply with the standard in this section.

(2) There must be a minimum of 90 centimetres of natural material throughout the area with a saturated hydraulic conductivity that is no greater than 1×10^{-8} metres per second or equivalent protection between the top of the load-bearing surface of the confinement area and bedrock or a permanent water table in areas deemed sensitive or within the two-year time of travel zone for a municipal well.

(3) Subsection (2) does not apply if,

(a) no part of the area is deemed sensitive or within the two-year time of travel zone of a municipal well and there is a minimum of 30 centimetres of natural material throughout the area between the top of the load-bearing surface of the confinement area and bedrock or a permanent water table; or

(b) part of the area is within the two-year time of travel zone of a municipal well, and,
(i) there is at least 90 centimetres of natural material throughout the area between the load-bearing surface of the area and bedrock or aquifer;
(ii) the phosphorous level in the natural material is less than 101 parts per million (sodium bicarbonate extractable); and
(iii) the area is left unused for no less than 24 months between uses.

High density seasonal areas on natural material, new or expanding areas

7.13 (1) In this section,

"new or expanding high-density seasonal confinement area means a high-density seasonal confinement area that is constructed or expanded by 20 percent or more in relation to the number of livestock confined, the amount of manure generated in the area or the animal density in the area after the date that this section applied to the operation by virtue of **section 7.1 (Phasing-in).**

(2) Where a new or expanding high-density seasonal confinement area located wholly or partly on natural material there must be throughout the area,

(a) a minimum of 90 centimetres of natural material with a saturated hydraulic conductivity that is no greater than 1×10^{-8} metres per second between the top of the load bearing surface of the area and the bedrock or aquifer; or

(b) equivalent protection between the top of the load bearing surface of the area and the bedrock or aquifer.

(3) Subsection 2 does not apply if,

(a) the area is left unused for a minimum of 24 months between uses; and

(b) there are at least 90 centimetres of natural material throughout the area between the load-bearing surface of the area and the bedrock or aquifer and the soil phosphorous level in that material is less than 101 parts per million (sodium bicarbonate extractable).

PERMANENT OUTDOOR CONFINEMENT AREAS

Permanent outdoor confinement areas, runoff controls

7.14. (1) This section applies to a permanent outdoor confinement area.

(2) The confinement area must be managed to minimize the runoff of contaminated water from the area.

(3) Without limiting subsection (2), natural or manufactured runoff prevention, treatment and containment systems may be used to minimize the runoff of contaminated water from the confinement area, including the following:

1. Diversion of clean up-slope water away from the confinement area.

2. Use of vegetated buffer zones for the treatment of runoff water.

3. Runoff collection and storage systems sufficient to deal with the runoff and meet the standards for manure and runoff storage under **Part VIII (Construction Standards).**

(4) New facilities in the confinement area shall be sited in accordance with the standards for agricultural buildings, including the standards for setbacks from surface water and separation distances.

Permanent outdoor confinement areas, manure

7.15 (1) This section applies to a permanent outdoor confinement area.

(2) Manure must be removed from the confinement area,

(a) as required to prevent accumulation of the manure in the area; and

(b) in any case, at least once a year.

(3) If the confinement area has a load-bearing surface of natural material, and has permanently located feeders (for example, fence-line feeders), the feeders must be provided with a load-bearing surface with the following characteristics:

1. It must be large enough to allow livestock to be fully supported while feeding at the feeder.

2. It must be constructed to prevent the feet of the livestock from sinking more than 40 centimetres below the surface of the natural material at any time.

Low-density permanent outdoor confinement areas

7.16. (1) This section applies to a low-density permanent outdoor confinement area on a farm unit.

(2) A person who manages the area shall ensure that the number of livestock kept in all such confinement areas on the farm unit is controlled so that the annual maximum amount of nutrient units such livestock would be capable of generating is less than 300 nutrient units.

(3) There must be a minimum of 90 centimetres of natural material throughout the area with a saturated hydraulic conductivity that is no greater than 1×10^{-8} metres per second or equivalent protection between the top of the load-bearing surface of the confinement area and the bedrock or aquifer in the vicinity of the area.

High-density permanent outdoor confinement areas

7.17 (1) This section applies to a high-density outdoor confinement area.

(2) The confinement area must be constructed to prevent access by livestock to surface water.

(3) The confinement area must have at least one impervious layer that consists of any of the following:

1. A paved surface composed on Portland cement concrete, asphalt cement concrete or any other impervious paving material.

2. A minimum of two metres of natural material between the top of the load-bearing surface of the confinement area and bedrock or a permanent water table, with a hydraulic conductivity no greater that 1×10^{-8} metres per second.

3. Any natural or engineered material that offers equivalent or greater protection, with design and construction verified by a professional engineer.

(4) If the confinement area is located wholly or partly on natural material, subsection (3) may be satisfied in a different way for different parts of the area.

PART VIII

SITING AND CONSTRUCTION STANDARDS FOR BARNS AND NUTRIENT STORAGE FACILITIES

8.1. – Section left blank

GENERAL

8.2. (1) Subject to subsection (2), no person shall construct a permanent nutrient storage facility or expand an existing permanent nutrient storage facility unless the new facility or expansion, including any associated monitoring systems, is designed by a professional engineer, constructed under the supervision of a professional engineer and inspected upon completion by a professional engineer to confirm that the work has been

carried out in accordance with the design.

(2) The following nutrient storage facilities or sites do not need to be designed by a professional engineer, constructed under the supervision of a professional engineer or inspected upon completion by a professional engineer if they are constructed in accordance with the requirements of the applicable Ministry protocol:

(a) permanent solid nutrient storage facilities under 600 m^3 in size with retaining walls that do not have an exposed height that exceeds 1200 mm; and

(b) temporary in-field nutrient storage sites.

(3) No person shall carry out a hydrogeologic or geotechnical investigation for the purposes of this regulation unless such person is a professional engineer or a professional geoscientist or is working under the supervision of a professional engineer or a professional geoscientist.

(4) No person shall construct a permanent liquid nutrient storage facility or expand an existing permanent liquid nutrient storage facility except in accordance with this regulation and the applicable Ministry protocol (NSTS-04).

(5) No person shall construct a permanent solid nutrient storage facility or expand an existing permanent solid nutrient storage facility except in accordance with this regulation and the applicable Ministry protocol (NSTS-05).

(6) No person shall construct a permanent earthen nutrient storage facility or expand an existing permanent earthen nutrient storage facility except in accordance with this regulation and the applicable Ministry protocol (NSTS-06).

(7) No person shall install a synthetic liner in a new or expanded permanent nutrient storage facility except in accordance with this regulation and the applicable Ministry protocol (NSTS-07a).

(8) No person shall install a compacted clay liner in a new or expanded permanent nutrient storage facility except in accordance with this regulation and the applicable Ministry protocol (NSTS-07b).

SITING

8.3. No person shall construct a permanent nutrient storage facility or expand an existing permanent nutrient storage facility except in accordance with the requirements of the Minimum Distance Separation II document published by the Ministry of Agriculture and Food and any set back distances established by the regulations, unless the municipality or the Director approves a variance from the requirements of MDS II or the

Director approves a variance from the requirements of the regulations to mitigate an effect on the natural environment resulting from such construction.

8.4. No person shall construct a permanent nutrient storage facility or expand an existing permanent nutrient storage facility,

(a) within 15 metres of a well that has a continuous steel casing that extends at least 6
metres below the surface of the ground;

(b) within 100 metres of a well that supplies water to a municipal water system; or

(c) within 30 metres of any other well.

8.5. Subject to section 8.8 no person shall construct a permanent nutrient storage facility or expand an existing permanent nutrient storage facility without,

(a) locating all field drainage tiles or piped municipal drains within 15 metres of the perimeter of the facility;

(b) removing all drainage tile within the 15 metre zone around the facility in accordance with the OMAF publication entitled "Nutrient Storage Facilities and Tile Drainage Systems"; and

around ?

(c) redirecting the flow of the field drainage system or piped municipal drain away from the facility.

8.6. No person shall construct a permanent nutrient storage facility or expand an existing permanent nutrient storage facility that does not have a flow path that is at least 50 metres long to the top of the bank of the nearest surface water source unless the surface water source is an artificial facility intended to collect, re-circulate or otherwise manage contaminated runoff from the facility.

8.7. No person shall construct a permanent nutrient storage facility or expand an existing permanent nutrient storage facility within the regional or 1 in 100 year flood lines established by the municipality or by the local Conservation Authority unless,

(a) the Director is satisfied that the location of the facility does not affect the control of flooding or pollution or the conservation of the land; or

(b) a permit for the facility is issued under section 28 of the *Conservation Authorities Act.*

8.8. (1) A person who constructs a drainage system, within 15 metres of a permanent nutrient storage facility, that is intended to collect or divert water away from the facility shall ensure that the system is constructed with non-perforated pipe and that all subsurface joints in the piping are properly sealed unless,

(a) water collected by the drainage system discharges into an approved treatment system; or

(b) the foundation drains of the permanent nutrient storage facility are equipped with an observation and shut-off station that has been installed in accordance with the OMAF publication entitled "Nutrient Storage Facilities and Tile Drainage Systems".

(2) No person shall permit liquid nutrients to enter a tile drainage system unless the system is equipped with an approved treatment system designed to treat effluent containing such nutrients.

GROUNDWATER PROTECTION

8.9. No person shall construct or expand a permanent liquid nutrient storage facility for agricultural source material unless the person retains the services of a professional engineer or professional geoscientist to carry out a stage one hydrogeologic or geotechnical investigation of the proposed site that,

(a) identifies the soil type or types to a depth of at least,
(i) 1.5 metres below the lowest elevation of the excavation required for a structure made of concrete or steel; or
(ii) 2.5 metres below the lowest elevation of the excavation required for an earthen structure; and

(b) establishes the depth of the aquifer and bedrock in relation to the lowest elevation of the excavation required for the facility.

8.10. Subject to section 8.19, no person shall construct or expand a permanent liquid nutrient storage facility for agricultural source material on a site that does not meet or exceed the following requirements:

(a) unlined concrete or steel storage facilities, with reinforced concrete floors require a minimum of 0.5 metre of hydraulically secure soil between the bottom of the storage facility and the upper most identified bedrock layer or aquifer;

(b) lined concrete or steel storage facilities with reinforced concrete floors require a minimum of 0.5 metre of native undisturbed material or compacted granular material between the bottom of the storage facility and uppermost identified bedrock layer or aquifer;

(c) unlined concrete or steel storage facilities with unreinforced concrete floors require a minimum of 1.0 metre of hydraulically secure soil between the bottom and sides of the storage facility and the upper most identified bedrock layer or aquifer;

(d) lined concrete or steel storage facilities with unreinforced concrete floors require a minimum of 1.0 metre of native undisturbed material or compacted granular material between the bottom of the storage facility and the uppermost identified bedrock layer or aquifer;

(e) lined earthen nutrient storage facilities require a minimum of 2.0 metres of hydraulically secure soil between the bottom and sides of the lined storage facility and the upper most identified bedrock layer or aquifer; and

(f) nutrient storage facilities that are designed to incorporate a combined system such as a facility that has earthen walls and a concrete floor shall satisfy the most restrictive criteria for the types of material used in the construction of the facility.

8.11. Subject to section 8.19, no person shall construct a permanent solid nutrient storage facility or expand such a facility on a category 4 agricultural operation that does not contain a concrete floor unless, the person retains the services of a professional engineer or professional geoscientist to carry out a stage one hydrogeologic or geotechnical investigation of the proposed site that establishes,

(a) the soil type or types to a depth of 1.5 metres below the lowest elevation of the excavation required for the facility; and

(b) that there is at least 0.5 metre of hydraulically secure material between the bottom of the facility and the uppermost identified bedrock or aquifer.

8.12. An unlined permanent earthen nutrient storage facility, with a maximum storage depth of 3.0 metres and a maximum storage volume of 2500 m^3, can be used to store liquid agricultural source materials listed in paragraphs 2 to 6 of section 1.6 if;

(a) the facility has at least 2.0 metres of hydraulically secure material between the bottom and sides of the facility and the upper most identified bedrock layer or unconfined aquifer;

(b) the soil materials that form the interior surface of the proposed facility are disked to a depth of at least 15 centimetres and recompacted with an approved compaction device;

(c) any soil anomalies that are discovered during construction, such as course material lenses, large rocks or soil fractures shall be excavated and filled with an approved clay based material to a depth of one metre;

(d) topsoil shall be stripped to the subsoil layer from the area where any berm is to be constructed and stockpiled for use in the outside slopes of the structure; and

(e) any above ground berms shall be constructed of a material that is suitable for compaction to meet a maximum saturated hydraulic conductivity of 1 x 10^{-9} metres per second and be compacted to at least 95% modified Proctor according to accepted engineering test criteria.

8.13. The professional engineer or professional geoscientist responsible for the investigation referred to in sections 8.9 and 8.11 shall analyze the data collected for the study to determine the suitability of the proposed site for a permanent liquid manure storage facility or a permanent solid manure storage facility with an earthen floor located on a category 4 agricultural operation.

8.14. If the results of the stage one investigation confirm that appropriate site conditions, as listed in section 8.10 exist beneath and adjacent to the proposed site then the proponent may proceed with construction of the facility.

8.15. If the results of the stage-one investigation do not confirm the suitability of the proposed site for the construction and operation of a permanent liquid manure storage facility the proponent of the project may,

(a) look for another site;

(b) construct a facility that is suitable for the site in accordance with section 8.11; or

(c) carry out a stage two investigation of the proposed site in accordance with the applicable Ministry protocol.

8.16. If the results of the stage-two investigation confirm that appropriate site conditions as listed in section 8.11 exist beneath and adjacent to the proposed site then the proponent may proceed with construction or the facility.

8.17. If the results of the stage-two investigation fail to confirm that the proposed site is a suitable location for the proposed facility the proponent may,

(a) look for another site;

(b) construct a facility that is suitable for the site in accordance with section 8.11; or

(c) conduct a stage-three investigation of the proposed site.

8.18. If the proponent elects to conduct a stage-three investigation of the proposed site the terms of reference for the stage three investigation shall be developed by the proponent's professional engineer or professional geoscientist to determine what measures could be used to provide adequate protection for the ground water and approved by the Director.

8.19. If the results of the stage three investigation fail to confirm that the proposed site is a suitable location for the proposed facility the proponent may,

(a) look for another site;

(b) construct a facility that is suitable for the site in accordance with section 8.11; or

(c) have a qualified professional develop an appropriate design, specific to the site, which will provide a level of protection for the groundwater which is the equivalent of the structures listed in section 8.11.

TEMPORARY NUTRIENT STORAGE SITES

8.20. No person shall store liquid nutrients in a temporary in-field nutrient storage site.

8.21. The location of a temporary in-field nutrient storage site shall satisfy the following requirements:

(a) the minimum depth of unconsolidated soil to bedrock shall be 1.5 metres;

(b) the minimum depth of unsaturated soil shall be 0.9 metre above the permanent water table;

(c) nutrient with more than 70% moisture content shall not be stored on soils that have rapid infiltration rates (Hydrological Soil Group A) as defined by soil hydrologic group in the Drainage Guide (Ministry of Agriculture and Food Publication 29); and

(d) it shall not,
(i) be located in the regional or 1 in 100 year flood zone; or
(ii) have a slope greater than 3%.

8.22. Temporary in-field nutrient storage sites shall be managed in accordance with the following criteria:

(a) except as provided for in section 8.27 a farmer receiving nutrients and storing them in a temporary in-field nutrient storage site on a farm unit can not receive and store a volume of nutrients that is greater than the quantity of nutrients that the farmer plans to use for crop production at that farm unit based on a compliant nutrient management plan;

(b) non-agricultural source material stored in a site must be used at the farm unit where it is stored and can not be transferred to another farm unit;

(c) if more than one type of nutrient is stored at a site the nutrients shall be managed in accordance with the most restrictive requirements applicable to any of the nutrients on the site;

(d) where the site is located on a slope it shall be located near the top of the slope to minimize the exposure of the nutrients to up-slope runoff or the site shall be equipped with runoff diversion structures;

(e) where the site is located within a 150 metres long flow path from surface water a vegetated buffer strip at least 3 metres wide is required between the site and the surface water;

(f) where the site is located in an area that is tile-drained,

(i) the site shall be pre-tilled or the field tiles shall be monitored weekly for coloured liquid or odour; and

(ii) there must be a contingency plan in place to deal with contaminated liquid in the tiles.

(g) nutrients shall not be stored at a site for longer than the maximum time prescribed for each nutrient; and

(h) the site may be used again in the following year if:

(i) the site is cultivated and planted with a cover crop after the nutrients are removed from the site;
(ii) a vegetative cover is established on the site during the growing period following the removal of the nutrients from the site; and
(iii) the soil phosphorus levels are maintained below 101 parts per million (sodium bicarbonate extractable).

8.23. No person shall locate a temporary in-field nutrient storage site,

(a) within 45 metres of a well, with a watertight casing to a depth of at least six metres, below ground level;

(b) within 90 metres of any other well;

(c) with less than a 90 metre flow path to surface water;

(d) within 200 metres of a single residence if the site contains de-watered municipal sewage biosolids;

(e) within 125 metres of a single residence if the site contains prescribed materials other than de-watered municipal sewage biosolids;

(f) within 450 metres of a residential area if the site contains de-watered municipal sewage biosolids; or

(g) within 250 metres of a residential area if the site contains prescribed material other than de-watered municipal sewage biosolids.

8.24 Subject to section 8.26 no person shall store nutrients in a temporary in-field nutrient storage site for longer than the following periods:

(a) de-watered municipal sewage biosolids may be stored for a maximum of 10 days;

(b) prescribed material which is left uncovered may be stored for a maximum of 60 days with the exception of municipal sewage biosolids and manure stored in accordance with clause (c);

(c) manure may be stored uncovered for 120 days if it is stored in a pile with a maximum height of 3 metres and a maximum width of 6 metres and it is turned so that every piece of material in the pile is displaced from its former position and mixed or inverted, every;
(i) 15 days if the moisture content of the manure is greater than 70 percent;
(ii) 30 days if the moisture content of the manure is greater than 50 percent and not more than 70 percent; or
(iii) 60 days if the moisture content of the manure is not more than 50 percent; and

(d) prescribed material that is covered, with the exception of municipal sewage biosolids, may be stored for 120 days.

8.25 The operator shall maintain records for all temporary in-field nutrient storage sites under the operator's control including;

(a) the date the site was established;

(b) the date or dates the pile was displaced and mixed or inverted, if applicable;

(c) the date the pile was removed; and

(d) a sketch indicating the location of the site relative to surface waters and other temporary in-field storage sites

8.26. The Director may authorize a person to increase the storage period or the amount of prescribed material which may be received at a temporary in-field nutrient storage site if he or she is satisfied that the person is meeting the Ministry of the Environment Interim Guidelines for the Production and Use of Aerobic Compost in Ontario or the Ministry of Agriculture and Food Protocol for On-Farm Composting.

NUTRIENT TRANSFER SYSTEMS

8.27. No person shall transfer liquid nutrients from place to place on a farm unit by means of a liquid nutrient transfer system unless the system has been designed and constructed and is operated in accordance with the requirements of the applicable

Ministry protocol (MTST-10).

8.28. A nutrient transfer system that has been constructed in accordance with the applicable Ministry protocol (NSTS-10) does not require monitoring for groundwater movement.

MONITORING WITHIN A TWO-YEAR WATER CAPTURE ZONE

8.29. The owner or operator of a new or expanding agricultural operation that is located within the two-year water capture zone of a well that supplies water to a municipal water system that includes a permanent liquid nutrient storage facility shall ensure that monitoring of groundwater movement under the facility is carried out in accordance with sections 8.31 to8.39 of this regulation.

8.30. For all category 4 agricultural operations a professional engineer shall carry out the installation and monitoring of the monitoring system and samples shall be submitted to an approved laboratory for analysis whenever they are collected.

8.31. An internal monitoring system for groundwater movement shall be comprised of a water leachate collection and monitoring system located between the 1st and 2nd protective layers of the facility that is composed of granular material that is capable of capturing any leakage that may occur from the permanent liquid nutrient storage facility.

8.32. For the purposes of section 8.31 a protective layer includes a synthetic liner, a natural liner, concrete, or hydraulically secure soil.

8.33. (1) For all category 1 to 3 agricultural operations a qualified person shall carry out installation of the internal monitoring system for groundwater movement.

(2) The owner of the storage facility or a person designated by the owner shall monitor the system and take samples of any liquid that is found in the monitoring system and the owner is responsible for submitting the samples to an approved laboratory for analysis when they are taken.

8.34. The samples shall be tested for ammonium and chlorides.

8.35. If ammonium or chlorides are found in the sample, at levels which are 10 times greater than the levels established by monitoring background levels,

(a) all liquid in a tile drain monitoring system shall be pumped into the permanent liquid nutrient storage facility or into an approved treatment system; and

(b) the monitoring system shall be monitored on a weekly basis and any liquid found shall be tested until ammonium or chlorides are less that 10 times greater than the levels established by monitoring background levels.

8.36. If ammonium or chlorides levels are not greater than 10 times background levels in the weekly samples sampling and testing shall be carried out on a bi-weekly basis, reduced to a bi-monthly basis after 4 tests and further reduced to 2 times per year after 5 years of operation.

8.37. (1) An accredited laboratory shall analyze samples taken from a monitoring system.

(2) The results of the analysis shall be reported to the owner or operator of the farm unit.

8.38. The owner or operator of the farm unit shall notify the Ministry of the Environment by speaking with a person at the Ministry's Spills Action Centre, if the amount of leakage exceeds predicted levels for a new facility as specified by the designer.

8.39. The owner or operator of the farm unit shall ensure that a record of the leakage monitoring results is kept at the business office of the farm unit.

DECOMMISSIONING OF NUTRIENT STORAGE FACILITIES

8.40. The owner or operator of a permanent nutrient storage facility shall ensure that it is properly decommissioned when,

(a) it is temporarily taken out of service; or

(b) it is no longer required for the storage of nutrients.

8.41. (1) A person who is temporarily decommissioning a permanent nutrient storage facility shall:

(a) remove the contents of the storage facility or maintain the contents in a manner that does not jeopardize the safe operation of the structure;

(b) maintain a minimum of 0.3 meters of freeboard; and

(c) maintain the facility in a good state of repair and safe working condition

(2) A person who has temporarily decommissioned a permanent nutrient storage facility shall,

(a) inspect the facility periodically and not less frequently than once a year to ensure that it doesn't present a hazard to people or the natural environment;

and

(b) have the facility inspected and evaluated by a professional engineer at 10 year intervals in accordance with the applicable Ministry protocol (NSTS – 12).

8.42. (1) A person who is permanently decommissioning a permanent nutrient storage facility shall,

(a) remove all remaining nutrient from the facility;

(b) pressure wash the walls and floors of the facility to remove any nutrient left on those surfaces if the facility is made out of concrete or steel; and

(c) dispose of the remaining nutrient and wash water in accordance with a compliant nutrient management plan.

(2) If the facility is made out of concrete or steel the person shall,

(a) collapse the walls of the structure onto the floor if the structure is located below grade; or

(b) manage or dispose of the steel and concrete components of the structure in accordance with provincial law.

(3) If the facility is made out of earth the person shall,

(a) remove any earth that is contaminated by nutrients and dispose of it in accordance with a compliant nutrient management plan; and

(b) push any berms made of earth into the cavity.

(4) In the case of either subsection (2) or (3) the person shall complete the decommissioning of the facility by,

(a) filling the cavity with clean soil or other fill material that has the same permeability as the surrounding soil;

(b) mounding the fill above the original grade to allow for settling of the fill;

(c) top-dressing the site with 15 centimetres of top soil; and

(d) establishing vegetation on the site.

8.43. No person shall allow water to accumulate on the site of a permanently decommissioned permanent nutrient storage facility.

NUTRIENT STORAGE CAPACITY FOR NEW OR EXPANDING LIVESTOCK OPERATIONS

8.44. No person shall commence a new livestock operation or expand an existing livestock operation that generates liquid manure that does not include as part of the farm unit a permanent nutrient storage facility or facilities that is or are capable of containing at least all of the nutrient produced on or received at the operation during a period of 240 days with the following exceptions:

(a) a farmer who sends some of the nutrient generated on the farmer's agricultural operation to a broker and that broker require an aggregate storage capacity of 240 days between them; or

(b) where the period of use of a permanent livestock confinement area is less than 240 days the storage capacity of the permanent nutrient storage facility associated with the area must be adequate for the period of confinement.

8.45. No person shall commence a new livestock operation or expand an existing livestock operation that generates solid manure that does not have a permanent nutrient storage facility or facilities that is or are capable of containing at least all of the nutrient produced on or received at the operation during a period of 240 days with the following exceptions:

(a) a farmer who sends some of the nutrient generated on the farmer's agricultural operation to a broker and that broker require an aggregate storage capacity of 240 days between them;

(b) the farmer's nutrient management strategy provides for the disposal of the nutrient generated on the agricultural operation by means that eliminate the need for 240 days of nutrient storage on the operation; or

(c) where the period of use of a permanent livestock confinement area is less than 240 days the storage capacity of the permanent nutrient storage facility associated with the area must be adequate for the period of confinement;

COMPREHENSIVE EVALUATION OF EXISTING PERMANENT NUTRIENT STORAGE FACILITIES

8.46. (1). Subject to subsection (2) owners and operators of existing agricultural operations that generate nutrients shall carry out a comprehensive evaluation of the permanent nutrient storage facilities located on their operations within the following time limits:

(a) Category 4 - on or before March 31, 2004;

(b) Category 2 and 3 – on or before March 31, 2005; or

(c) Category 1 – on or before March 31, 2008.

(2) Where the owner or operator built a permanent nutrient storage facility in accordance with the standards contained in the "Agricultural Pollution Control Manual" between April 1, 1994 and March 31, 2003, the owner or operator shall have a comprehensive evaluation of the facility carried out by a professional engineer within 10 years of the date the building permit for the facility was issued or the date as determined by subsection (1), whichever is the later.

8.47. (1) Subject to subsection (2) owners and operators of agricultural operations that receive nutrients but do not generate nutrients shall have their permanent nutrient storage facilities evaluated by a professional engineer within the following time limits:

(a) Category 4 - on or before March 31, 2004;

(b) Category 2 and 3 – on or before March 31, 2005; and

(c) Category 1 – on or before March 31, 2008.

(2) Where the owner or operator built a permanent nutrient storage facility in accordance with the standards contained in the "Agricultural Pollution Control Manual" between April 1, 1994 and March 31, 2003, the owner or operator shall have a comprehensive evaluation of the facility carried out by a professional engineer within 10 years of the date the building permit for the facility was issued or the date as determined by subsection (1), whichever is the later.

8.48. Within the time periods specified in section 8.47 all owners and operators of existing agricultural operations shall ensure that their permanent nutrient storage facilities are capable of containing at least all of the nutrient produced on or received at the operation during a period of 240 days with the following exceptions:

(a) a farmer who sends some of the nutrient generated on the farmer's agricultural

operation to a broker and that broker require an aggregate storage capacity of 240 days between them;

(b) where the period of use of a permanent livestock confinement area is less than 240 days the storage capacity of the permanent nutrient storage facility associated with the area must be adequate for the period of confinement; or

(c) where the nutrient management plan allows for a lesser period of time to be required for storage then the storage will meet the requirements of the plan

8.49. For the purposes of sections 8.46 and 8.47 an owner or operator of,

(a) any agricultural operation must demonstrate on the basis of reliable information that each permanent liquid nutrient storage facility located on the owner's or operator's agricultural operation; and

(b) a category 4 agricultural operation that stores solid nutrient on the operation in a facility that does not have a concrete floor must demonstrate on the basis of reliable information that each permanent solid nutrient storage facility located on the owner's or operator's agricultural operation, is not having an adverse effect on surface or groundwater resources by,

(i) ensuring that there is no evidence of significant leakage into perimeter drains around the facility; and

(ii) determining the need for an observation station.

8.50. For the purposes of section 8.49 "reliable information" includes,

(a) a report based on an investigation conducted by a professional engineer that takes into consideration the topographic, geologic and hydrogeologic features of the agricultural operation in relation to the siting and operation of its permanent nutrient storage facilities; or

(b) a peer-reviewed Environmental Farm Plan prepared by or on behalf of the owner or operator of the agricultural operation that has been evaluated from time to time in accordance with the requirements of the plan.

8.51. No person shall construct or enlarge an operation that generates or stores non-agricultural prescribed materials unless the new or expanded operation has a permanent nutrient storage facility or facilities that is or are capable of containing at least all of the nutrient produced on or received at the operation during a period of 240 days.

8.52. Owners or operators of existing operations that generate or store non-agricultural prescribed materials shall manage such materials in accordance with their nutrient management strategy.

8.53. If an existing permanent nutrient storage facility does not meet the setback requirements of this regulation the owner or operator of the facility shall provide documentation in the owner's or operator's nutrient management plan that indicates the shortfall between the set back of the existing facility and the setback requirements of this regulation.

Part IX
Sampling, Analysis and
Quality Standards for Land-Applied Materials

9.1. In this Part,

"analyze" in relation to a sample means to analyze or to ensure that a sample is analyzed;

"approved design capacity" in relation to a sewage treatment works means design capacity as approved for the sewage treatment works pursuant to an approval issued under the *Ontario Water Resources Act*;

"collect" in relation to a sample means to collect or to ensure that a sample is collected;

"determine" means to determine or to ensure is determined;

"land" means land that is used for an agricultural purpose and excludes residential gardens;

"nitrogen" means: (i) in relation to non-agricultural source materials, total kjeldahl nitrogen, (ammonia and ammonium) nitrogen and (nitrate and nitrite) nitrogen, and
(ii) in relation to agricultural source materials, total kjeldahl nitrogen and (ammonia and ammonium) nitrogen;

"NMAN" means the nutrient management computer program (NMAN 2003) as established by the Ministry of Agriculture and Food, and as amended from time to

time, which is also available in a workbook format for the purpose of preparing nutrient management plans and nutrient management strategies;

"person who applies material" includes a generator of the material;

"person who intends to apply material" includes a generator of the material;

"phosphorus" means total phosphorus, except as otherwise provided by this regulation;

"production capacity" means the quantity of non-agricultural source material capable of being produced in one year determined on a dry weight basis and as identified in the Generator" s nutrient management strategy;

"regulated metal" means a metal listed in Column 1 of Table 1.

Sampling and Analysis Procedures
9.2. (1) Each person who is required to carry out sampling and analysis obligations under this Part shall:

(a) do so in accordance with the **[applicable Ministry protocol]**, as it may be amended from time-to-time, except where otherwise provided by this regulation;

(b) use the results determined under sections **9.6, 9.7, 9.8, 9.12, 9.13, and 9.15 and the NMAN program** to determine the application rates for the material analyzed; and

(c) incorporate the application rates into the nutrient management plan for the application of the material.

(2) Where an arithmetic average or geometric mean of concentrations is required to be determined, the most recently determined arithmetic average or geometric mean, as the case may be, shall be used for the purpose of this regulation.

Calculations - general
9.3. (1) For the purposes of performing a calculation under this regulation the person shall use the actual analytical result obtained by the laboratory doing the analyses for the purposes of this regulation.

(2) Subsection (1) does not apply where the person is performing a calculation by using data in the NMAN program.

Obligations under approvals, orders, etc.

9.4. (1) The requirements of this regulation are in addition to and independent of the requirements in an approval, order or instrument issued under any Act and in the event of conflict, shall prevail unless the requirement in this regulation is less stringent than the requirement under an approval, order or instrument issued under any Act.

(2) Subsection (1) does not apply to a requirement under a municipal by-law.

Limitation on application - general
9.5. No person shall apply to land a prescribed material or a commercial fertilizer at a rate that exceeds the application rate for the material or fertilizer as provided in the nutrient management plan.

PARAMETERS: NITROGEN, PHOSPHORUS, POTASSIUM, TOTAL SOLIDS, VOLATILE SOLIDS

Sample collection " Agricultural source material " Category 1, 2, 3, 4
9.6. (1) Each person who applies to land an agricultural source material generated at a Category 1, 2, 3 or 4 farm unit shall, prior to the application to land, collect at least one sample from the material to be applied for analysis for each of the parameters of nitrogen, phosphorus, potassium and total solids on each occasion when the nutrient management strategy or nutrient management plan in relation to the material is required to be renewed or updated by this regulation.

Analysis
(2) Each person who has a sampling obligation under subsection (1) and collects one sample from the material to be applied for analysis shall determine by using laboratory analysis, the concentration in the material for each of the parameters of nitrogen, phosphorus, potassium and total solids.

Same
(3) Each person who collects more than one sample for the purposes of analyzing the parameters listed in subsection (1) shall:

(a) determine using laboratory analysis, the concentration in the material for each sample for each of the parameters of nitrogen, phosphorus, potassium and total solids; and

(b) determine the arithmetic average of the concentrations of the parameters analyzed under clause (a) and for the purpose, the arithmetic average shall be determined using the concentrations determined under clause (a) in each of the

preceding 12 months, including the month in which the samples were analyzed for the parameters listed in subsection (1) for the parameters.

USE OF NMAN DATA
(4) Despite subsections (1), (2) and (3), when the NMAN program provides default data for concentrations of the parameters required by subsection (2) for the agricultural source material, a Category 1, 2 or 3 Generator may, instead of collecting and analyzing samples for the parameters in accordance with subsection (1), use the default data in the NMAN program to provide the concentration of the parameters required by subsection (2) or the arithmetic average of the concentrations required by subsection (3) in relation to each of the parameters of nitrogen, phosphorus, potassium and total solids.

Sample collection " non-agricultural source material " paragraph 1.7 (1) 3
9.7. (1) Each person who applies to land a material prescribed under paragraph 1.7 (1) 3 shall, prior to the application to land, collect a sample from the material to be applied for analysis for each of the parameters of nitrogen, phosphorus, potassium, total solids and volatile solids in accordance with the frequency for sampling for those parameters required to be sampled for the sewage treatment works under the *Ontario Water Resources Act* or for the material under the *Environmental Protection Act*, and in any case, not less often than the following:

a. for sewage treatment works with an approved design capacity of 22,700 cubic metres per day or less, the person shall collect no less than 6 samples in a year, including samples as follows:

one sample in each month when the material is being applied, and
one sample in each of the two months preceding the first application of material.

b. for sewage treatment works with an approved design capacity of greater than 22,700 cubic metres per day but less than 45,400 cubic metres per day, the person shall collect no less than one sample per month;

c. for sewage treatment works with an approved design capacity of 45,400 cubic metres per day or greater, the person shall collect no less than two samples per month.

Analysis, Calculation of average of concentrations
(2) Each person who has a sampling obligation under subsection (1) shall for each sample determine:

(a) using laboratory analysis, the concentration in the material for each of the parameters of nitrogen, phosphorus, potassium, total solids and volatile solids; and

(b) the arithmetic average of the concentrations of the parameters analyzed under clause (a) and for the purpose, the arithmetic average shall be determined using the four most recent samples analyzed for the parameters.

Sample collection " non-agricultural source material " other than paragraph 1.7 (1) 3

9.8. (1) Each person who applies to land a non-agricultural source material other than one prescribed under paragraph 1.7 (1) 3 shall, prior to the application to land, collect a sample from the material to be applied for analysis for each of the parameters of nitrogen, phosphorus, potassium, total solids and volatile solids in accordance with any frequency for sampling required under the *Environmental Protection Act* in relation to the material, and in any case, not less often than the following:

for facilities with a production capacity of 1,250 tonnes or less, the person shall collect no less than 6 samples in a year, including samples as follows:

i. one sample in each month when the material is being applied, and

one sample in each of the two months preceding the first application of material.

b. for facilities with a production capacity of greater than 1,250 tonnes but less than 2,500 tonnes, the person shall collect no less than one sample per month;

c. for facilities with a production capacity of greater than 2,500 tonnes, the person shall collect no less than two samples per month.

Analysis and calculation of average concentrations

(2) Each person who has a sampling obligation under subsection (1) shall for each sample determine:

(a) using laboratory analysis, the concentration in the material for each of the parameters of nitrogen, phosphorus, potassium, total solids and volatile solids; and

(b) using the arithmetic average of the concentrations of the parameters analyzed under clause (a) and for the purpose, the arithmetic average shall be determined using the four most recent samples analyzed for the parameters.

Regulated Metals

Table 1: Standards for Regulated Metals

Column 1	Column 2	Column 3	Column 4
Regulated Metals	Maximum metal concentration in non-agricultural source materials	Maximum metal addition to soil receiving non-agricultural source materials	Maximumum metal concentration in soils receiving non-agricultural source materials
	(mg / Kg of TS[1] d.w[2].)	(Kg / Ha / 5 Years)	(mg / Kg of Soil, d.w.)
Arsenic	170	1.40	14
Cadmium	34	0.27	1.6
Cobalt	340	2.70	20
Chromium	2800	23.30	120
Copper	1700	13.60	100
Mercury	11	0.09	0.5
Molybdenum	94	0.80	4
Nickel	420	3.56	32
Lead	1100	9.00	60
Selenium	34	0.27	1.6
Zinc	4200	33.00	220

[1] TS means total solids.
[2] d.w. means dry weight.

Soil Sample Collection

9.9. (1) Each person who intends to apply to land a non-agricultural source material shall, prior to the application to land collect samples in accordance with the **[applicable ministry protocol.]** from the soil to which the material is proposed to be applied for analysis for each regulated metal not less than once in the five year period immediately prior to the application of the material.

(2) Where the soil of the land to which the material is proposed to be applied has been analyzed under subsection (1) by another person for each regulated metal in the 5 year period immediately prior to the application referred to in subsection (1), the person mentioned in subsection (1) is relieved of the obligation to collect and analyse samples under subsections (1) and (3) if that

person instead uses the laboratory data that were obtained by the other person under subsection (3) during the 5 year period.

Analysis

(3) Each person who has a sampling obligation under subsection (1) shall determine by laboratory analysis for the samples collected, the concentration of each regulated metal in accordance with the **applicable Ministry protocol]**

Prohibition on Application

(4) No person who has an obligation under subsection (1) shall apply a non-agricultural source material to land if a concentration for a regulated metal determined under subsection (3) exceeds the Maximum metal concentration in soils receiving non-agricultural source materials as set out in Column 4 of Table 1 for the regulated metal.

Analysis " non-agricultural source material

9.10. (1) Each person who applies to land a non-agricultural source material shall, prior to the application to land, for each sample collected under section 9.7 or 9.8, determine by laboratory analysis the concentration in the material for each regulated metal.

Same

(2) Where a person is required under subsection (1) to make a determination and the person has collected more than the minimum number of samples required under subsection 9.7 (1) or 9.8 (1), the person is relieved of the requirement to determine the concentration in the material for the additional samples collected under subsection 9.7 (1) or section 9.8 (1) and instead is required to determine by laboratory analysis the concentration in the material for each regulated metal for the minimum number of samples collected under subsection 9.7 (1) or 9.8 (1).

Determination of arithmetic average of concentrations

(3) Each person who is required to determine a concentration for a regulated metal under subsection (1) or (2) shall determine the arithmetic average of the concentration of each regulated metal in milligrams per kilogram of the material dry weight and for the purpose, the arithmetic average shall be determined using the four most recent samples analyzed.

Prohibition on Application

(4) No person who has an obligation under subsection (1) or (2) shall apply a material to land if the most recently determined arithmetic average for a concentration of a regulated metal determined under subsection (3) exceeds the Maximum metal

concentration in non-agricultural source materials as set out in Column 2 of Table 1 for the regulated metal and where the person continues intending to apply the material to land, the person shall comply with the requirements in subsection (5).

Resampling

(5) Where a person determines that an arithmetic average for a concentration of a regulated metal under subsection (1) or (2) exceeds the Maximum metal concentration set out in Column 2 of Table 1 for a regulated metal and the person continues to intend to apply the material to land, the person shall:

- continue to collect samples in accordance with subsection 9.7 (1) or 9.8 (1) with an interval of no less than 2 days between the samples collected;
- analyze each sample to determine the concentration in the material for each regulated metal; and
- determine the arithmetic average concentration for each of the regulated metals as required by subsection (1) or (2) until the most recent arithmetic average no longer exceeds the Maximum metal concentration set out in Column 2 of Table 1 for the regulated metal.

Determination of metal additions

9.11. (1) Where a person determines under subsection 9.10 (3) or (5) that the most recently determined arithmetic average for a concentration of a regulated metal does not exceed the Maximum metal concentration set out in Column 2 of Table 1 for the regulated metal, the person shall determine pursuant to clause (2) (b) and section 9.12 the addition which may be made to soil for each regulated metal in each month in which a non-agricultural source material is applied to the land.

(2) The addition in subsection (1) shall be determined in kilograms for each regulated metal per hectare dry weight by:

(a) multiplying the most recent arithmetic average determined under subsection 9.10 (3) or (5) for a material by the quantity of the material in tonnes per hectare, dry weight, intended to be applied to the land in that month and multiplying by a unit conversion factor of 0.001; and

(b) adding the quantity of each regulated metal determined under clause (a) to the quantity of that regulated metal applied to the land as a result of the application of non-agricultural source material each month in each year for the previous four calendar years commencing on January 1st of the first year up to and including the current year.

Determining application rates

9.12 Each person who has an obligation to conduct analyses under section 9.9, 9.10, or 9.11 shall determine the application rate of the material for the purpose of the nutrient management plan and for that purpose, the person shall ensure that the quantity of a regulated metal determined under paragraph 9.11 (2)(b) does not exceed the Maximum metal addition to soil receiving non-agricultural source materials set out in Column 3 of Table 1 for the regulated metal.

Determining least application rate

9.13. Each person who has an obligation to determine an application rate for non-agricultural source material under this regulation shall further determine which application rate determined under section 9.7 or 9.8 and 9.12 is the least.

Incorporation into nutrient management plan

9.14 Each person who has an obligation to determine the least application rate for a material under section 9.13 shall, subject to section 9.15, incorporate the rate into the nutrient management plan for the material.

Limitation on application rate - non-agricultural source material - paragraph 1.7 (1) 3

9.15 (1) Subject to subsection (2), each person who has an obligation to determine the least application rate under section 9.13 in relation to a material prescribed under paragraph 1.7 (1) 3 shall incorporate into the nutrient management plan for the material the least application rate.

(2) No person shall use a least application rate for non-agricultural source material which prescribed under paragraph 1.7 (1) 3 exceeds 8 tonnes dry weight of the material per hectare in each 5 year period following the coming into force of this regulation.

PATHOGENS

Interpretation

9.16 For the purposes of section 9.17 to 9.19:

"pathogen material" means non-agricultural source material prescribed under paragraph 1.7 (1) 3 that is treated by a process that is described as a Pathogen

Treatment Process in the **[applicable Ministry protocol to be named]** as amended from time to time.

Prohibition on Application

9.17. No person shall apply to land a non-agricultural source material prescribed under paragraph 1.7 (1) 3 unless the material has been treated by a pathogen treatment process and in accordance with this regulation.

Pathogen Sample collection

9.18 (1) Each person who intends to apply to land a pathogen material shall, prior to the application to land, collect a sample from the material to be applied for analysis for E. Coli in accordance with the following:

a. for sewage treatment works with an approved design capacity of 22,700 cubic metres per day or less, the person shall collect no less than 6 samples in a year, including samples as follows:

1.one sample in each month when the material is being applied, and

2.one sample in each of the two months preceding the first application of material;

b. for sewage treatment works with an approved design capacity of greater than 22,700 cubic metres per day but less than 45,400 cubic metres per day, the person shall collect no less than one sample per month;

c. for sewage treatment works with an approved design capacity of 45,400 cubic metres per day or greater, the person shall collect no less than two samples per month.

Analysis

(2) No person who has a sampling obligation under subsection (1) shall apply the material unless prior to the application, the person has determined by laboratory analysis the density in the material for E.Coli.

Geometric Mean density

(3) Each person who is required to determine a density under subsection (2) shall determine a geometric mean density of E. Coli and for the purpose the geometric mean density shall be determined using the four most recent samples collected and analyzed under subsection (1).

(4) Where the geometric mean density determined under subsection (3):

a. does not exceed the maximum density of 2 x 10^6 colony forming units per gram total solids, dry weight, the person may apply the material to land in accordance with this regulation;

b. exceeds the maximum density set out in clause (a), no person shall apply the material to land and where the person continues to intend to apply the person shall:

i. continue to collect samples in accordance with subsection (1) and shall maintain an interval of at least 2 days between successive sampling days;
ii. analyze each sample to determine the density of E. Coli in accordance with subsection (2), and
iii. determine the geometric mean density for E. Coli in each sample collected in accordance with subsection (3) until the most recent geometric mean density no longer exceeds the maximum density set out in clause (a).

Application of Pathogen material

9.19. No person who has an obligation under subsection 9.18 (1) shall apply the material to land unless the most recent geometric mean determined under clause 9.18 (4) (a) or clause 9.18 (4) (b) (iii) does not exceed the maximum density set out in clause 9.18 (4) (a).

Odour Control

Odour classification
9.20. Each person who is required to prepare a nutrient management plan or strategy shall, for the purpose, determine the odour classification of each prescribed material intended to be applied to land in accordance with the **[applicable Ministry protocol]** as amended from time to time.

Separation distances, incorporation practices
9.21 Each person who is required to determine an odour classification for a material under section 9.20 shall:

a. use the classification to determine the separation distance and incorporation practices for each material intended to be applied to the land under section 6.17 and 6.18 of this regulation; and

b. incorporate into the nutrient management plan or strategy, the separation distance and incorporation practices determined under clause (a).

Part X
TRAINING AND LICENCING

Nutrient management plan or strategy development licence
10.1. (1) No person shall prepare a nutrient management plan or nutrient management strategy prior to March 31, 2004, for a farm unit for which an approval is required under this Regulation unless the person has attended Day 1 and Day 2 workshops approved by the Director.

(2) By no later than March 31, 2004, no person shall prepare a nutrient management plan or nutrient management strategy for an operation when they are not an owner operator or employee of that operation, except under and in accordance with a nutrient management plan or nutrient management strategy development licence.

(3) Subsections (1) and (2) do not apply to a person who is an owner, operator or employee of the operation.

Same - requirements

(4) The Director shall issue an initial nutrient management plan or nutrient management strategy development licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who meets the following qualifications:

1. The applicant has completed a nutrient management plan or nutrient management strategy development course approved by the Director or has appropriate, previous formal or non-formal training approved by the Director;

2. The applicant has had at least 3 plans for Category 3 or 4 farm units approved by the Director in accordance with section 4.1; and

3. The applicant has obtained a passing grade on a nutrient management plan or nutrient management strategy development exam approved by the Director.

(5) The Director shall issue a subsequent nutrient management plan or nutrient management strategy development licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who meets the following qualifications:

1. The applicant has obtained an initial or subsequent nutrient management plan or nutrient management strategy development licence and has not had the licence cancelled; and
2. The applicant has obtained a passing grade on a nutrient management plan or nutrient management strategy development exam approved by the Director.

(6) For greater clarity, subsection (2) does not prevent a person from preparing a nutrient management plan or nutrient management strategy for a Category 3 or 4 farm unit provided:

(a) the purpose of developing the plan or strategy is to meet the requirements in clause (4)2; and
(b) the plan or strategy developed is submitted to the Director for approval.

Nutrient application business licence

10.2. (1) For the purpose of this section, a nutrient application business includes the application of prescribed materials.

(2) By no later than March 31, 2005, no person shall engage in a nutrient application business except under and in accordance with a nutrient application licence.

Nutrient application business licence - requirements

(3) The Director shall issue an initial nutrient application business licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who has completed a nutrient application business training course approved by the Director or has appropriate, previous formal or non-formal training approved by the Director.

(4) The Director shall issue a subsequent nutrient application business licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who meets the following qualifications:

1. the applicant has obtained an initial or subsequent nutrient application business licence with a five year term and has not had the licence cancelled; and

2. the applicant has successfully completed a subsequent nutrient application business training course approved by the Director.

Nutrient application commercial enterprise licence

10.3 (1) For the purpose of this section, a person who is engaged in the application of nutrients on a fee-for-service basis is engaged in the application of nutrients to land on behalf of a commercial enterprise.

(2) By no later than March 31, 2006, no person shall engage in the application of nutrients to land on behalf of a commercial enterprise except under and in accordance with a nutrient application commercial enterprise licence.

Same- requirements

(3) The Director shall issue an initial nutrient application commercial enterprise licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who has completed a nutrient application commercial enterprise training course approved by the Director or has appropriate, previous formal or non-formal training approved by the Director.

(4) The Director shall issue a subsequent nutrient application commercial enterprise licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who meets the following qualifications:

(a) The applicant has obtained an initial or subsequent nutrient application commercial enterprise licence with a five year term and has not had the licence cancelled; and

(b) The applicant has successfully completed a subsequent nutrient application commercial enterprise training course approved by the Director.

Nutrient application licence - Category 3, 4

10.4 (1) By no later than March 31, 2006, no person who owns or operates an agricultural operation which requires an approved nutrient management plan or nutrient management strategy shall apply nutrients to the land without a Category 3-4 nutrient application licence.

(2) Subsection (1) does not apply to an owner who engages a manager to be responsible for nutrient application at the farm unit, provided the manager has a Category 3-4 nutrient application licence.

Same - requirements

(3) The Director shall issue an initial Category 3-4 nutrient application licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who meets the following qualificatrions:

1. The applicant has successfully completed a Category 3-4 nutrient application training course approved by the Director; or

2. The applicant has appropriate, previous formal or non-formal training approved by the Director.

(4) The Director shall issue a subsequent Category 3-4 nutrient application licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who meets the following qualifications:

1. The applicant has obtained an initial or subsequent Category 3-4 nutrient application licence with a five year term and has not had the licence cancelled; and

2. The applicant has successfully completed a subsequent Category 3-4 nutrient application course approved by the Director.

Brokers Licence

10.5 (1). By no later than March 31, 2005, no person shall act as a broker except under and in accordance with a brokers licence.

Same - requirements

(2) The Director shall issue an initial brokers licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who meets the following qualifications:

1. The applicant has successfully completed a brokers training course approved by the Director; or

1. The applicant has appropriate, previous formal or non-formal training approved by the Director.

(3) The Director shall issue a subsequent brokers licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who meets the following qualifications:

1. The applicant has obtained an initial or subsequent brokers licence with a five year term and has not had the licence cancelled; and

2. The applicant has successfully completed a subsequent brokers course approved by the Director.

Planning licence Category 3-4

10.6 (1) By no later than March 31, 2005 no person who owns or operates an agricultural operation which requires an approved nutrient management plan or nutrient management strategy shall develop a nutrient management plan or nutrient management strategy for the operation except under and in accordance with nutrient management planning licence.

Same - requirements

(2) The Director shall issue an initial nutrient management planning licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who meets the following qualifications:

1. The applicant has successfully completed a nutrient management planning course approved by the Director; or

2. The applicant has appropriate, previous formal or non-formal training approved by the Director.

(3) The Director shall issue a subsequent nutrient management planning licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who meets the following qualifications:

1. The applicant has obtained an initial or subsequent nutrient planning licence with a five year term and has not had the licence cancelled; and

2. The applicant has successfully completed a subsequent nutrient management planning course approved by the Director or has appropriate, alternate qualifications approved by the Director.

Category 1-2 licence

10.7 (1) By no later than March 31, 2007, each person who owns or operates an agricultural operation which does not require an approved nutrient management plan or nutrient management strategy but on which prescribed materials are generated or nutrients applied to land shall obtain a Category 1-2 licence.

(2) Subsection (1) does not apply to an owner who engages a manager to be responsible for nutrient application at the farm unit, provided the manager has obtained a Category 1-2 licence.

(3) Subsections (1) and (2) do not prevent the holder of a planning licence category 3 – 4 from carrying out the functions of the holder of a category 1-2 licence holder.

Same - requirements

(4) The Director shall issue an initial Category 1-2 licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who meets the following qualifications:

1. The applicant has attended a nutrient management plan seminar or nutrient management strategy seminar approved by the Director; or

2. The applicant has appropriate, previous formal or non-formal training approved by the Director.

(5) The Director shall issue a subsequent Category 1-2 licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who meets the following qualifications:

1. The applicant has obtained an initial or subsequent Category 1-2 licence and has not had the licence cancelled; and

2. The applicant has attended an additional nutrient management plan seminar or nutrient management strategy seminar approved by the Director or has alternate qualifications approved by the Director.

Reviewer licence

10.8 (1) By no later than March 31, 2005, no person shall review a nutrient management plan or nutrient management strategy for approval except under and in accordance with a reviewer licence.

Same - requirements

(2) The Director shall issue an initial reviewer licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who meets the following qualifications:

1. The applicant has a nutrient management plan or nutrient management strategy development licence;

2. The applicant has completed a nutrient management plan or nutrient management strategy reviewer course approved by the Director or has appropriate, previous formal or non-formal training approved by the Director;

3. The applicant has had no less than 10 nutrient management plans, nutrient management strategies, or a combination of plans and strategies approved by the Director; and

4. The applicant has obtained a passing grade on a nutrient management plan or nutrient management strategy reviewer exam approved by the Director.

(3) The Director shall issue a subsequent reviewer licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who meets the following qualifications:

1. The applicant has obtained an initial or subsequent reviewer licence and has not had the licence cancelled; and

2. The applicant has obtained a passing grade on a nutrient management plan or nutrient management strategy reviewer exam approved by the Director.

Trainers licence

10.9 (1) By no later than March 31, 2006, no person shall provide training in nutrient management planning except under and in accordance with a trainer licence.

Same - requirements

(2) The Director shall issue an initial trainer licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who meets the following qualifications:

1. The applicant has a nutrient management plan or nutrient management strategy reviewer licence;

2. The applicant has completed a nutrient management plan or nutrient management strategy trainer course approved by the Director or has appropriate, previous formal or non-formal training approved by the Director;

3. The applicant has reviewed no less than 10 nutrient management plans, nutrient management strategies, or a combination of plans and strategies and the Director has approved the plans or strategies; and

4. The applicant has obtained a passing grade on a nutrient management plan or nutrient management strategy trainer exam approved by the Director.

(3) The Director shall issue a subsequent trainer licence with a five year term, to an applicant who has paid the fee, if any, established by the Minister and who meets the following qualifications:

1. The applicant has obtained an initial or subsequent trainer licence and has not had the licence cancelled; and

2. The applicant has obtained a passing grade on a nutrient management plan or nutrient management strategy trainer exam approved by the Director.

Preparation of non-agricultural nutrient management strategy

10.10 By no later than March 31, 2005, no person who owns, manages or operates a generator of non-agricultural source materials mentioned in paragraphs 1 to 4 of subsection 1.7 (1) and no intermediate handler that is required to have a nutrient management strategy shall have a nutrient management strategy prepared other than by a person licenced to prepare nutrient management strategies under this Part.

Cancellation of Licences

10.11 (1) The Director may, by written notice, amend or cancel a licence if the holder of the licence contravenes the Act or regulations or in the opinion of the Director the holder has demonstrated incompetence or bad faith in carrying out the activity with respect to which the licence is issued.

(2). A notice shall not be issued under subsection (1) unless the Director has given at least (15) fifteen days written notice of the Director"s intention to do so.

(3). Written notices under subsection (1) and (2) shall provide reasons for the Director"s proposal under subsection (2) or decision under subsection (1).

(4). Written notice under subsection (1) shall set out the procedure for appeals under section 9 of the Act.

PART XI
RECORD-KEEPING

General

11.1. Every owner or operator of a farm unit or other operation, which is subject to this regulation, shall keep detailed records of the operation in accordance with this Part for a minimum period of seven years, or such longer period as the Director may require.

11.2. All records maintained under this Part shall be stored at the farm unit or operation, unless it is not practical to do so, in which case they shall be stored at a location which is accessible to the operator on a 24 hour a day basis

11.3. All records may be kept by means of paper copies, mechanical, electronic or other devices provided the registrant:

(a) takes adequate precautions, appropriate to the means used, to guard against the risk of falsification or alteration of the information recorded; and

(b) provides a means for making the information available in an accurate and intelligible form within a reasonable time to any person lawfully entitled to examine the records.

11.4. Records that shall be maintained by the owner or operator of the farm unit or operation under this Part include:

1. The farm unit description used for the nutrient management or strategy;
2. The farm category and the calculation by which the category was determined.
3. Maintenance and inspection records of any permanent and temporary nutrient storages.
4. Certificates of operation issued to the operation;

5. Compliant nutrient management strategies or plans and approvals and certificates for those strategies and plans;
6. Records of soil and nutrient analyses done for purposes of the Act.
7. Site characterization studies;
8. Records of complaints received in written form;
9. Activity logs, containing information such as quantities of nutrients in each storage, dates and quantities of nutrient application, cropping practices and yields, livestock purchases and sales, feed records, outdoor feeding and temporary infield nutrient storage records, as outlined in the applicable ministry protocol;
10. Records of events when the contingency plan was used or a spill event occurred.
11. The records referred to in subsections 11.6(2)(3).

11.5. Any person who is any holder of a licence under Part X shall maintain a copy of each licence at the location of their operation or business.

Specific Informational Requirements For Plans And Strategies

11.6. (1) When an identification number is required for a nutrient management strategy or plan for purposes of this Regulation, OMAF shall assign the nutrient management strategy and nutrient management plan a unique identification number and advise the person by or for whom the nutrient management strategy or nutrient management plan was prepared of that identification number.

(2) Where a nutrient management strategy or nutrient management plan provides for the use of another nutrient management strategy or nutrient management plan for the use or disposal of some or all of the nutrients dealt with by the first mentioned nutrient management strategy or nutrient management plan the person by or for whom the first mentioned nutrient management strategy or nutrient management plan was prepared shall advise each person (the "recipient") by or for whom the other nutrient management strategies or nutrient management plans were prepared the identification assigned by OMAF for the first mentioned nutrient management strategy or nutrient management plan and the recipient shall keep a record of that number so that the recipient may keep records of the nutrients received from others. Similarly the recipient shall provide the identification assigned by OMAF for the recipient's nutrient management strategy or nutrient management plan to the first mentioned person so that person can keep a record of the nutrients delivered to others .

(3) Every person by or for whom a nutrient management strategy or nutrient management plan is prepared shall keep a record of all nutrients generated by that person or received from others and the use, transfer to others or disposal of those nutrients in accordance with the procedure set out in in the applicable ministry protocol.

Part XII

Local Advisory Committees

12.1. In Part 12 of this regulation,

"committee" means a local advisory committee;

"council" means the council of a municipality;

"municipality" means a single-tier municipality or an upper-tier municipality as defined in the *Municipal Act, 2001*, as amended.

12.2. Subject to this Part a council may, by by-law, establish a committee to address nutrient management issues in the municipality.

12.3. A Municipality shall follow the committee structure as outlined in section 12.4 when establishing a Local Advisory Committee.

12.4. (1) A committee shall consist of not fewer than five persons who are residents of the municipality appointed by the council.

(2) The council may appoint a chair and one or more vice-chairs from among the members of the committee.

(3) A majority of the members of the committee shall be persons who are farmers or who represent an agricultural operation located in the municipality.

(4) At least one member of the committee shall be a person who is not a farmer or representative of an agricultural operation.

(5) At least one member of the committee shall be appointed from among the members of the council or the staff of the municipality.

(6) The committee shall adopt rules of procedure to facilitate its activities.

12.5. (1) The council shall ensure that all members of the committee have knowledge of nutrient management practices.

(2) The council shall ensure that members of the committee who are involved in the mediation of disputes have knowledge of mediation practices.

12.6. The members of the committee shall:

(a) follow the prescribed procedure for mediations as set out in section 12.7 when engaged in mediation;

(b) follow the prescribed procedure for educational activities as set out in section 12.8 when engaged in education; and

(c) follow the prescribed procedure for consultations as set out in section 12.9 when engaged in consultations.

Mediation

12.7 (1) Members of the Local Advisory Committees may mediate incidents:

a) reported by local residents to the local municipality, which do not violate the Act, the Environmental Protection Act, or the Ontario Water Resources Act; or

b) reported to the Ministry of the Environment, which are referred to the Local Advisory Committee at the discretion of the Ministry of the Environment.

(2) If at any time during the course of mediating a dispute the chair of the committee is advised by a director or a provincial officer that the matters in dispute do involve an alleged violation of the Act, the Environmental Protection Act, or the Ontario Water Resources Act the committee shall suspend its process until the alleged violations have been dealt with in accordance with the applicable legislation.

(3) The staff of the Ministry of Environment shall use its statutory discretion when referring complaints to a committee.

(4) Subject to the requirements of the *Municipal Freedom of Information and Protection of Privacy Act* and other relevant legislation all mediations shall be conducted on a confidential basis.

Conflict of Interest

(5) Where a member of a committee, who is assigned to mediate a dispute has, either on his or her own behalf or while acting for, by, with or through another, has any pecuniary interest, as defined in the *Municipal Conflict of Interest Act*, R.S.O. 1990, c. M.50, direct or indirect, in the matter, he or she,

a) shall, prior to participating in the mediation of a dispute, disclose the interest and the general nature thereof; and

b) shall not take part in the discussion or mediation of any question in respect of the matter unless all parties agree otherwise.

(6) The outcome of a mediation of a dispute does not relieve any of the parties to the dispute of the responsibility to comply with the requirements of any Act that governs the management of materials that contain nutrients.

(7) Members of a committee who act as mediators shall not provide advice that might be regarded as legal advice to any of the parties to the dispute or their representatives.

(8) Members of committees shall conduct mediations in accordance with the applicable ministry protocol.

Education

12.8. (1) Members of a committee may engage in educational activities related to the management of materials containing nutrients on a formal or informal basis.

(2) Committees may hold seminars for the purpose of educating people about matters related to the management of materials containing nutrients.

(3) The members of a committee may consult with representatives of the Ministry of Agriculture and Food regarding the presentation and content of educational seminars.

Consultation

12.9. (1) Subject to subsection (2) the members of a committee may consult with representatives of the municipality with regard to issues related to the management of materials containing nutrients including site plan or building permit issues.

(2) The members of a committee shall not engage in the processes of evaluating, approving or endorsing nutrient management strategies or nutrient management plans.

Reports to Council

12.10. The by-law that establishes a committee may require the chair of the committee to provide reports about its activities to the clerk of the municipality from time to time.

Nutrient Management Protocols
For
Ontario Regulations
Made under the
Nutrient Management Act, 2002

Draft for Discussion Purposes Only

November, 2002

TABLE OF CONTENTS

1 Part 1 - Introduction

This document is the "Nutrient Management Protocol" referred to in the regulations of the Nutrient Management Act. It is meant to outline technical and scientific details that are in addition to the standards set out in the regulations. The additional information is useful in developing nutrient management strategies and nutrient management plans that demonstrate compliance with the regulations.

1.1 *CATEGORIES OF OPERATIONS*

All operations that generate, store, use, or transport prescribed materials or commercial fertilizers used in crop production are categorized under the Nutrient Management Act. The categorization of these operations will facilitate implementation of the regulations and are outlined in the regulations.

1. Agricultural operations need to define their farm unit in order to place themselves into a category.
2. Non-agricultural operations are category 6.
3. Intermediate generators are category 9 and may or may not be agricultural operations but nevertheless have their own category because of this unique practice. They must follow the same requirements as agricultural operations.

1.2 *TERMINOLOGY AND CONTEXT*

A nutrient management strategy describes the management, storage, and the destination of the prescribed materials generated. All generators of a prescribed material are categorized and must complete a nutrient management strategy.

Prescribed materials are listed in the regulations and are broken down into agricultural and non-agricultural sources.

A nutrient management plan describes the management of land application of a prescribed material. If you own or control land that nutrients are applied to then you must complete a nutrient management plan.

Nutrients are both prescribed materials and commercial fertilizer.

Note for agricultural operations: it is possible for the operation to generate prescribed materials and apply them to land so they need to develop a nutrient management strategy and a nutrient management plan. This is further discussed later in this Protocol.

2 Part 2 - Define Your Operation

2.1 *AGRICULTURAL OPERATIONS NEED TO DEFINE THEIR FARM UNIT(S)*

Agricultural operations are further defined by the farm unit. A farm unit is described and defined by the regulation. An operation must first define their farm unit in order to put the operation into a category.

A declaration has to be made that identifies all the land and any facilities in the farm unit. The **farm unit Declaration Form** is used to make this declaration. One form is required for each farm unit declared. Ontario Ministry of Agriculture and Food (OMAF) will devise a numbering system for farm units, and this number will be called the farm unit identifier.

- An operator of an agricultural operation may declare more than one farm unit within their operation.
- There is no minimum land ownership requirement for the land included in the farm unit. Manure/Biosolid Application Agreements for the property that is not owned by the farm unit operator are required.
- There is no maximum amount (cap) of nutrient units per farm unit.
- A nutrient management strategy and/or nutrient management plan must be completed for each farm unit.
- The farm unit Identifier must be noted on the (s) and plan(s) for that farm unit.

2.2 *NON-AGRICULTURAL OPERATIONS*

A non-agricultural operation under the Nutrient Management Act is an operation that generates land applied prescribed materials.

Examples of these operations are
Municipal Sewage Treatment Plants
Pulp and Paper Mills
Operations whose nutrient material has been approved for land application by the Biosolids Utilization Committee (BUC).

BUC is a multi-stakeholder, inter-ministerial committee that provides a forum for information exchange, and that advises and makes recommendations to the MOE and OMAF on matters related to the utilization of biosolids and residuals on agricultural land. Those non-agricultural operations who wish to land apply their material, and have not already done so, must apply to BUC for approval of their material for land application.

These operations must create a nutrient management strategy and submit it to the Environmental Assessment and Approvals Branch of the Ministry of the Environment for review by the appointed time.

2.3 *INTERMEDIATE GENERATORS*

An "intermediate generator" is a person who controls an Intermediate operation carried out with nutrients not generated by that operation that results in the production of nutrient with characteristics different from those of the nutrient as it was received. Different characteristics are things such as: nutrient content, density and volume.

The types of Intermediate operations considered "intermediate generators" include composting, mushroom farming, and anaerobic digestion.

An intermediate generator must:

- Complete a nutrient management strategy for their operation;
- Identify the source generator's nutrient management strategy;
- Ensure adequate approvals and certificates are obtained for any processing methods or applications;
- Obtain an operation Identifier;
- Record all off-farm sourced materials required and approved for the process(es) used.

Generators that store, mix or process materials that fall under the EPA, are not included in Intermediate Generators. The standard requirement of a waste disposal CofA (transfer/processing) will continue to apply to these operations (i.e. leaf and yard composting is governed under Regulation 101, EPA)

3 Part 3 – Nutrient Units: How Agricultural Operations Categorize Their Farm Units that Generate or Receive Manure

Using the Nutrient Units **(NU)** concept helps ensure an 'apples to apples' comparison between sizes and types of farm units using the same set of input and output parameters. It is a better reflection of environmental risk to ground and surface water based on nutrients produced and applied; and will be more flexible to changes in the industry.

Nutrient Units **will not** be used to establish landbase requirements for a farm unit, since this will be based on the farm unit's specific nutrient management plan. It is **not** the same as Livestock Units, which are currently used in calculating Minimum Distance Separation (MDS) setbacks.

3.1 *DEFINITION OF A NUTRIENT UNIT USED TO ESTABLISH THE CATEGORY OF A FARM UNIT*

For agricultural operations that manage manure it is necessary to determine the number of nutrient units managed to establish what category they belong in:

- For Categories 5 through 9 the category is determined on the type of operation rather than the number of nutrient units managed.
- For Categories 1 through 4 the category is based on the amount of nutrient generated **or** received.
- For farm units that generate **and** receive they will have to determine two categories for the one farm unit. First the category of the farm unit based only on the number of NU generated and second, the category of the farm unit based only on the number of NU received. This farm unit will be need to do a nutrient management strategy and/or plan based on the phase in schedule and which of the two categories it has is brought in first. See the example in 3.3.2 of this Protocol.

3.2 *TABLES OF NUTRIENT UNIT ASSIGNMENTS TO CERTAIN FARM ANIMALS*

3.2.1 Number of animals per Nutrient Unit *on Farm Units* ***Generating*** *Manure*

Animal (based on highest design capacity of the farm unit at one time	**# Animals per NU**
Dairy cow (large-frame, 1200-1400 lbs, milking or dry, such as Holsteins)	0.7
Dairy heifers (large-frame, 400-1150 lbs, such as Holsteins)	2.0
Dairy calves (large-frame, 100-400 lbs, such as Holsteins)	6.0
* Dairy cow (large-frame, 1200-1400 lbs, milking or dry (Holsteins); includes calves/heifers)	*0.55
Dairy cow (medium-frame, 1000-1200 lbs, milking or dry, such as Guernseys)	0.85
Dairy heifers (medium-frame, 325-1000 lbs, such as Guernseys)	2.4
Dairy calves (medium-frame, 85-325 lbs, such as Guernseys)	7.0
* Dairy cow (medium-frame, 1000-1200 lbs, milking or dry (Guernseys); includes calves/heifers)	*0.66
Dairy cow (small-frame, 800-1000 lbs, milking or dry, such as Jerseys)	1.0
Dairy heifers (small-frame, 275-800 lbs, such as Jerseys)	2.9
Dairy calves (small-frame, 65-275 lbs, such as Jerseys)	8.5
*Dairy cow (small-frame, 800-1000 lbs, milking or dry (Jerseys); includes calves/heifers	*0.77
Beef cows (includes unweaned calf and replacements)	1.0
Beef shortkeepers (900-1300 lbs)	2.0
Beef backgrounders (575-900 lbs)	3.0
Beef feeders (575-1250 lbs)	3.0
SEW (Segregated Early Weaning) Sows (lactating-aged sows, includes weaners to 15 lbs)	3.33
SEW Weaners (15-60 lbs)	20.0
Sow farrow-wean (lactating-aged sows, includes weaners to 60 lbs)	2.5
Finishing pigs (60-230 lbs)	6.0
Horses (mature to 1000 lbs)	1.0
Laying hens (after 2.9 lbs pullet stage, until end of laying period at about 3.75 lbs)	150
Layer pullets (day-old pullets placed, raised to 2.9 lbs)	500
Chicken broilers, floor growing area (total square feet, regardless of quota cycle, or finishing weight)	267 sq.ft
Turkey broiler/hen/tom growing space (total square feet, regardless of finishing weight)	267 sq.ft
Chicken broiler breeder growers (females and males transferred out to layer barn)	300
Chicken broiler breeder layers (females and males transferred in from grower barn)	100
Sheep, breeding-aged ewes (sheep raised for meat production; includes lambs, replacements and rams)	8.0
Feeder lambs, 70 to 125 lbs	20
Sheep, milking-aged ewes (sheep raised for milk production; includes lambs, replacements and rams)	6.0
Goats, milking-aged goats (goats raised for milk production; includes kids, replacements and bucks)	8.0
Milk-fed, or grain-fed veal calves	6.0
Several more animals will be added, including mink, quail, rabbits, fish, etc. as more information is available, plus typical liveweights of animals housed at one time, for situations that do not 'fit' the table well. Also, choose the most appropriate figures where weights do not match your situation exactly.	

* Most dairy farms house cows, calves and heifers on the same farm unit, so this number already accounts for this. So, for 100 Holstein milking and dry cows in a herd, divide by 0.55 cows per Nutrient Unit to obtain 182 Nutrient Units for the entire herd including calves and heifers. If housed on separate farm units, do separate calculations, using the individual number of cows, heifers or calves per Nutrient Unit. There could be very slight discrepancies in the resulting number of NU because of the rounding of numbers.

3.2.2 *Amount of Manure per Nutrient Unit for Farm Units that Receive Manure Generated on Other Farm Units.*

For each farm unit determine the category you are in based on the type and quantity of manure received over a one year period on your farm unit, from the following chart.

Manure Type	Quantity of Manure Per Nutrient Unit (NU)	Category 1 ≤ 30 NU	Category 2 >30 NU but ≤ 150 NU	Category 3 >150 NU but ≤ 300 NU	Category 4 > 300 NU
	Tons of Manure Received				
Dry -Bedded, Poultry Manure	3	≤90	>90 but ≤450	>450 but ≤900	>900
Dry- Bedded, Beef Cattle Manure	10	≤300	>300 but ≤1500	>1500 but ≤3000	>3000
Dry -Bedded, Horse Manure	20	≤600	>600 but ≤3000	>3000 but ≤6000	>6000

3.2.3 *Examples of Typical Sizes of Farm Animal Operations Fitting the Four Categories*

Farm Units that generate manure are divided into four (4) categories of size based on the total number of *Nutrient Units* of animals on the farm unit at one time, whether housed or pastured. This is only valid for farm units that have one type of livestock only. It the farm unit has more than one type of livestock the combination of the NU generated by the two types will need to be used to determine the farm unit's category. See example 3.3.1 in this Protocol.

Animal Sector Examples (based on highest design capacity of all farm buildings on the farm unit, or pastured animals)	Category 1 ≤ 30 NU	Category 2 > 30, but ≤ 150 NU	Category 3 > 150, but ≤ 300 NU	Category 4 > 300 NU
Milking-aged Holstein dairy cows (includes calves & heifers, so use 0.55 dairy cows/NU)	≤ 17	> 17, but ≤ 82	> 82, but ≤ 165	> 165
Milking-aged Guernsey dairy cows (includes calves & heifers, so use 0.66 dairy cows/NU)	≤ 20	> 20, but ≤ 99	> 99, but ≤ 198	> 198
Milking-aged Jersey dairy cows (includes calves & heifers, so use 0.77 dairy cows/NU)	≤ 23	> 23, but ≤ 115	> 115, but ≤ 231	> 231
Beef cows (including unweaned calf & replacements)	≤ 30	> 30, but ≤ 150	> 150, but ≤ 300	> 300
Beef shortkeepers (900-1300 lbs) (# of feedlot spaces)	≤ 60	> 60, but ≤ 300	> 300, but ≤ 600	> 600
Beef backgrounders (575-900 lbs) (# of feedlot spaces)	≤ 90	> 90, but ≤ 450	> 450, but ≤ 900	> 900
Beef feeders (575-1250 lbs) (# of feedlot spaces)	≤ 90	> 90, but ≤ 450	> 450, but ≤ 900	> 900
SEW Sows (lactating-aged sows; includes weaners to 15 lbs)	≤ 100	> 100, but ≤ 500	> 500, but ≤ 1,000	> 1,000
SEW Weaners (15-60 lbs) (# of weaner spaces)	≤ 600	> 600, but ≤ 3,000	> 3,000, but ≤ 6,000	> 6,000
Sow farrow-wean (lactating-aged sows; includes weaners to 60 lbs)	≤ 75	> 75, but ≤ 375	> 375, but ≤ 750	> 750
Finishing pigs (60-230 lbs) (# of spaces in barn)	≤ 180	> 180, but ≤ 900	> 900, but ≤ 1,800	> 1,800
Horses (mature at 1000 lbs) (# of spaces in barn)	≤ 30	> 30, but ≤ 150	> 150, but ≤ 300	> 300
Laying hens (# of layer spaces in barn)	≤ 4,500	> 4,500, but ≤ 22,500	> 22,500, but ≤ 45,000	> 45,000
Layer pullets (# of pullet spaces in barn)	≤ 15,000	> 15,000, but ≤ 75,000	> 75,000, but ≤ 150,000	> 150,000
Chicken broilers (total sq.ft of floor growing area)	≤ 8,000 sq.ft	> 8,000, but ≤40,000 sq.ft	> 40,000, but ≤80,000 sq.ft	> 80,000 sq.ft

		≤40,000 sq.ft	≤80,000 sq.ft	
Turkey broilers/hens/toms (total sq.ft of floor growing area)	≤ 8,000 sq.ft	> 8,000, but ≤40,000 sq.ft	> 40,000, but ≤80,000 sq.ft	> 80,000 sq.ft
Chicken broiler breeder growers (females and males transferred out to layer barn)	≤ 9,000	> 9,000, but ≤ 45,000	> 45,000, but ≤ 90,000	> 90,000
Chicken broiler breeder layers (females and males transferred in from grower barn)	≤ 3,000	> 3,000, but ≤ 15,000	> 15,000, but ≤ 30,000	> 30,000
Sheep, for meat (# of breeding ewes; includes lambs, replacements and rams)	≤ 240	> 240, but ≤ 3,750	> 3,750, but ≤ 2,400	> 2,400
Feeder lambs, 70 to 125 lbs	≤ 600	> 600, but ≤ 3,000	> 3,000, but ≤ 6,000	> 6,000
Sheep, dairy (# of milking-aged ewes; includes lambs, replacements and rams)	≤ 180	> 180, but ≤ 900	> 900, but ≤ 1,800	> 1,800
Goats, dairy (# of milking-aged goats; includes kids, replacements and bucks)	≤ 240	> 240, but ≤ 1,200	> 1,200, but ≤ 2,400	> 2,400
Milk or grain-fed veal (# of spaces)	≤ 180	> 180, but ≤ 900	> 900, but ≤ 1,800	> 1,800
More animals & systems to be added over time				

3.3 *EXAMPLE CALCULATION OF NUTRIENT UNITS FOR OPERATIONS THAT GENERATE OR RECEIVE MANURE*

3.3.1 *Example for calculating the number of Nutrient Units on a Farm Unit that generates manure and establishing what category of size it is:*

A dairy farmer has 70 Holstein cows (milking and dry, and considered as large-frame cows), with all calves and heifers kept on the same farm unit. Across the road, she also has two 40' x 300' x 2 story chicken broiler barns (48,000 square feet of floor growing area). The entire operation is managed as one farm unit.

70 Holstein cows ÷ 0.55 dairy cows/NU (when calves and heifers are included) = 127 NU
48,000 square feet of floor growing area ÷ 267 square feet/NU = 180 NU
307 NU

So, this farm **generates** enough manure to place it into **category 4.**

3.3.2 *Example for calculating the number of Nutrient Units on a Farm Unit that generates and receives manure and establishing what category of size it is:*

A farmer has farm buildings that will house at one time, 1200 finishing pigs, 9000 laying hens, and 60 beef feeders raised from about [a]575 lbs to 1250 lbs. He also receives 72 tons of dry-bedded poultry manure from the farm down the road. The entire farm is operated as one farm unit.

1200 finishing pigs ÷ 6 finishing pigs/NU = 200 NU
9000 laying hens ÷ 150 laying hens/NU = 60 NU
60 beef feeders ÷ 3 beef feeders/NU = 20 NU
280 NU

Although the 72 tons of dry-bedded poultry manure (24 NU) that this farm receives must be included in the farm's nutrient management plan, it does not bump-up this farm's category. So, this farm generates enough manure to place it into category 3, not category 4. This farm unit must now consider its two category types. Category 3 for how much it generates and category 1 for the dry-bedded poultry manure it receives. It will therefore be phased into the regulations by the dates set for category 3 because that is sooner than the dates for category 1.

Note that start and end weights may vary slightly from those in the table, since it is impossible to predict every situation. In these cases, choose the most appropriate figures.

3.3.3 *Example for calculating the number of Nutrient Units on a Farm Unit that receives manure and establishing what category of size it is:*

A corn producer receives 600 tons of dry-bedded poultry manure for his farm unit from manure.

600 tons of dry-bedded poultry manure ÷ 3 tons/NU = 200 NU

So, this farm receives enough manure to place it into category 3.

4 Part 4 – Introduction to Nutrient Management Strategies and Plans

4.1 *PURPOSE*

4.1.1 Nutrient Management Strategy

A nutrient management strategy accounts for the management of all generated and received prescribed materials in an environmentally acceptable manner. **All generators of prescribed materials must complete a nutrient management strategy as phased in by the regulations.**

4.1.2 Nutrient Management Plan

A nutrient management plan (NMP) details how nutrients are to be applied to a given landbase. A nutrient management plan is based on both the components of the nutrients used and the characteristics of the field. Together these are balanced to maximize the utilization of the nutrients by crops and to reduce environmental impacts. **All farm units who apply nutrients to agricultural land must complete a nutrient management plan as phased in by the regulations**.

4.2 *NMAN*

A nutrient management strategy or plan is completed using the NMAN Software program or the associated workbook developed by OMAF. These two methods are designed to either produce or accommodate **all** of the components of the nutrient management strategy and plan. Current versions of both can be found on the OMAF website. Both are going to serve as Appendices to this Protocol.

The person developing a nutrient management strategy or plan should use the most recent version of NMAN software or associated workbook.

For a farm unit, the farmer, with training from OMAF, can develop the plan on their own or they can hire a consultant trained and certified as per the regulations, to provide that service to them. For a non-agricultural operation that is developing a nutrient management strategy the same applies.

4.3 *THE DIFFERENCE BETWEEN NUTRIENT MANAGEMENT STRATEGY AND PLAN*

Prior to the Nutrient Management Act a 'nutrient management plan' was typically used for livestock operations and included information about the production and storage of manure as well as the field by field plan for application of the manure plus any commercial fertilizer or biosolids utilized on the farm. The Nutrient Management Act however, encompasses more than just livestock operations and the scope of the 'nutrient management plan' has been altered to accommodate other types of generators. Such non-agricultural nutrient generators include: municipal sewage treatment plants, pulp and paper mills as well as other agricultural generators such as greenhouses, vegetable

processing plants etc. Hence the division of the original 'nutrient management plan' into two parts: a nutrient management strategy for the production and storage of prescribed materials, and the nutrient management plan dealing exclusively with the field by field details for application of nutrients.

Nutrient management plans are completed for agricultural operations that apply nutrients to land. Nutrient management strategies are completed by all generators of prescribed materials including both agricultural and non-agricultural generators.

A nutrient management strategy, for generators (agricultural and non-agricultural), includes the following components that are **also** found in the required components of a nutrient management plan:

- Description of the operation
- Contingency plan
- Nutrient analysis
- List of storage facilities

And if the operation is a farm unit then:
- Farm Unit Declaration Form
- Farm unit sketch

4.3.1 Agricultural Operations that Don't Generate

When an agricultural operation that **doesn't generate** any prescribed materials (i.e. a cash crop operation) does a nutrient management plan, it is required to complete the components in the above list. There is still the need to give the description of the operation, provide a contingency plan and a nutrient analysis because they provide context for the rest of the nutrient management plan. Finally, these farm units require adequate storage for any nutrients received or used on the farm prior to application. Information pertaining to the generation of prescribed materials and the destinations other than land application do not have to be included.

4.3.2 Agricultural Operations that Do Generate

When an agricultural operation **does generate** and land applies (all of part of their prescribed materials) then they will be required to complete both a nutrient management strategy and plan (see Part 4 of this Protocol). In this case the components listed above only need to be completed once and the nutrient management strategy and plan must reference each other and should be kept together, especially for approval, certification, and inspection/enforcement processes.

4.4 *LETTERING FOR IDENTIFICATION OF THE COMPONENTS*

Within this protocol, all of the required components of a nutrient management strategy and nutrient management plan have been assigned a 'letter of the alphabet'. Wherever the same letter appears in two places in the Protocol, it refers to the same component. Because the nutrient management strategy and plan do not require all of the same components, all of the letters do not apear in the description of both.

	Content	Protocol Letter	Required in a Strategy	Required in a Plan
Operation Information	Description of the Operation	**A**	Yes (Y)	Y
	Agreements	**C**	Y	Y
For Farm Units	Farm Unit Declaration Form	**B**	Y	Y
	Farm Unit Sketch	**D**	Y	Y
	Minimum Distance Separation II	**E**	Y	N
Inventory and Description of Prescribed Materials	List of Prescribed Materials (generated and received)	**F**	Y	Y
	Nutrient Analysis	**G**	Y	Y
Destination and Storage	Destinations	**H**	Y	N
	Storage Facilities	**I**	Y	Y
	Contingency Plan	**J**	Y	Y
	Certification Form	**K**	Y	Y
Field Information	Field Properties	**L**	No (N)	Y
	Field Sketches	**M**	N	Y
	Soil Samples and Analysis	**N**	N	Y
Crop Information	Crop Rotation and Yields	**O**	N	Y
	Tillage Practices	**P**	N	Y
Nutrient Application Information	Commercial Fertilizer Application	**Q**	N	Y
	Application of Prescribed Materials	**R**	N	Y
	Agronomic and Crop Removal Balance for Nitrogen	**S**	N	Y
	Nitrogen Index	**T**	N	Y
	Application Limits for Phosphorous	**U**	N	Y
	Phosphorous Index	**V**	N	Y
	Common Land Application Setbacks/Limits	**W**	N	Y
	Demonstration of Adequate Landbase	**X**	N	Y

5 Part 5 - Nutrient Management Strategy For Agricultural Operations

5.1 *REVIEW AND RENEWAL OF A NUTRIENT MANAGEMENT STRATEGY*

A nutrient management strategy should be **reviewed** by the generator annually to ensure that it is still relevant and to recognize and account for any deviation from the strategy indicated in records kept of actual events.

All Nutrient Management Strategies must be **renewed** every five years. Renewal means to make amendments to the nutrient management strategy to account for changes over the last five years and to prepare for events over the next five years. If any of the following situations occur then the nutrient management strategy must be renewed before the end of the five-year cycle.

Situations requiring early renewal of a nutrient management strategy:

- the end of a year in which there is an increase of 20% or more in the quantity of nutrients generated or received at the operation since the first year of the nutrient management strategy;
- there is a change in ownership or control of the operation that adversely affects the capacity of the new operator to implement the fist nutrient management strategy;
- a change in the use of nutrients generated on the operation (e.g. to be processed by an intermediate operation rather than land applied);
- the end of a year in which there is an increase by 30 nutrient units or more in the quantity of nutrients exported to any other single operation since the previous year.;
- the commencement of operation of a new generating facility or nutrient storage facility .
- a Ministry of the Environment (MOE) Provincial Officer orders the nutrient management strategy to be updated.

5.2 *REQUIRED CONTENTS OF A NUTRIENT MANAGEMENT STRATEGY*

The nutrient management strategy must account for the total quantity of prescribed materials generated or received.

5.2.1 Operation Information and Identifier Numbers

Every operation will have a number to identify it. For farms this number is used to identify the farm unit and is therefore called the operation identifier and will be assigned by OMAF. For other generators this number will be referenced in this protocol as the operation identifier and will be assigned to operations by a provincial ministry.

A. Description of the Operation
A description must give details about the general type of operation that the nutrient management strategy is being prepared for as well as the size of operation and the prescribed material being produced. It must include the name and contact information for the operator of the operation if that hasn't already been done using the General Screen in NMAN. The description should also contain any unique or unusual details about the operation and indicate whether the nutrient management strategy is new or is a renewal.

B. Farm Unit Declaration Form
For an agricultural operation only, there is a required Farm Unit Declaration. It identifies the contact information for the farm unit operator and identifies the facilities and landbase associated with the operation. The Farm Unit Declaration is described in Part 2 of this protocol and can be completed using either the Farm Unit Declaration Form or generated using the farm unit Screen in NMAN.

C. Agreements
Agreements are necessary to demonstrate two types of events.

- an operation is, for a specified period of time, in control of a certain identified landbase, and
- nutrients are being transferred from one operation to another, which results in a change in the quantity of nutrients that each operation must account for in their nutrient management strategy.

Agreements must be signed and attached to the nutrient management strategy. There are three types of agreements recognized by the regulations and they can be found in Part 16 of this Protocol. They are:

Type of Agreement	Details
Broker Agreement	A broker agreement represents either a transfer from a generator to a broker or a transfer from a broker to a receiver. Each party to the agreement needs a signed copy. The broker must have the identifier of each generator or receiver they have an agreement with.
Nutrient Transfer Agreement	This form indicates that nutrients are being transferred to or from an operation and implies that that the nutrient management strategy and/or plan of each operation reflects that transfer.
Manure /Biosolid Application Agreement	This agreement documents the landowner's consent to apply nutrients to land that is not owned by the operator of the operation doing the nutrient management strategy. This agreement implies that for the duration of the agreement the land covered by the agreement becomes part of the farm unit that is applying the nutrients. It is therefore also part of the farm unit Declaration of that farm unit.

D. Farm Unit Sketch
Maps or sketches can be hand drawn, photos, or computer generated. A farm unit operator/controller may choose to do more than one sketch if it isn't possible to show the land belonging to the farm unit on one sketch or if there is too much information for one sketch. NMAN has placeholders for scanned images or links to picture files. Every map or sketch should be neat and readable and be presented with the direction north to the top of the page, denoted by a north arrow.

The sketch must address (either include or state that they don't' exist) the following items:

Location of all the landbase declared in the farm unit:
- Land that is owned or they have Manure/Biosolid Application Agreements for.
- Road names, municipality boundaries, neighbours, and other local features

Location of generation facilities and storage(s):
- Permanent, temporary and proposed generating facilities
- Permanent, temporary and proposed storage facilities
- Distance between facilities and distance to other buildings
- Dimensions of all facilities

Location of sensitive features:
- Known wells (includes gas, oil, test and water wells)
- Surface water (as defined in Part 9 of this Protocol)
- Residences and other designated health or educational facilities (as defined in Part 9 of this Protocol)

E. Minimum Distance Separation II (MDS II) Calculations
If the operation is new or expanding then a copy of the MDS II calculations issued or approved by the local building official or the director must be attached. For strategies that are being renewed or that don't represent a change in the farm animal facilities, no MDS calculation is required.

5.2.2 Inventory and Description of Prescribed Materials Produced and Received

F. List of Prescribed Materials
Every nutrient management strategy must have a list of all the prescribed materials generated and/or received that the operation manages. The list should be broken down into liquids and solids.

Prescribed Materials Received at an Operation
From the list of prescribed materials for the operation the following information is needed for prescribed materials that are received.

- Name of Generator and the generating operations identifier number
- Volume received
- Date received

- Applicable agreements (Nutrient Transfer Agreement or Broker Agreement)

Prescribed Materials Generated at an Operation

Manure
All the calculations with respect to the generation of manure can be done using the NMAN program or the workbook.

Farm animal Numbers
The number of livestock has to be stated and must be equal to or greater than standard OMAF housing capacity guidelines to ensure sufficient landbase should the farm unit fill to capacity during the period of time covered by the nutrient management strategy. A comprehensive explanation must be included if the number of farm animal housed is less than barn capacity to justify why fewer animals are in the barn if that is the case.

Animal Weights
If the nutrient management strategy utilizes animal weights that are lower than the default MSTOR values, a written explanation must be included to explain the lower weights.

Manure Volume
The total volume for each type of manure generated annually on the farm unit must be given in the nutrient management strategy. It must equal or exceed the annual volume of manure produced by all farm animal and poultry facilities on the farm unit.

Other Prescribed Materials (e.g. greenhouse and container nursery leachate)
The quantity of prescribed materials generated other than manure must be given using industry specific documentation or records from previous time periods that can project the quantity to be produced over the time period covered by the nutrient management strategy

G. Nutrient Analysis
A nutrient analysis for each of the prescribed materials in the nutrient management strategy must be provided. The nutrient analysis can be achieved either by conducting an actual lab analysis or by applying the NMAN databank average for that prescribed material type and projected dry matter. In either case the lab analysis or an update of the databank results must be incorporated into the nutrient management strategy every 5 years. For category 4 farm units an actual laboratory analysis of the nutrients is required for prescribed materials.

Lab Analysis
Lab analysis and sampling must be conducted in accordance with the sampling and analysis protocol in Part 14 of this Protocol. When laboratory analysis is conducted the nutrient content must be within 30% of the NMAN databank values for the same types of prescribed materials unless documentation is included that justifies a greater difference. For example, management practices or feed additives could potentially alter the nutrient content of a farm animal's manure.

Feed Additives

If manure nutrients are modified due to the use of feed additives, adequate information must be attached to verify that the feed additive was actually used, and to verify the influence of the additive on the nutrient content of the manure.

5.2.3 Destination of Nutrients Summary

H. Destinations
For all prescribed materials generated and received on the operation a detailed description of its intended destination is necessary. An acceptable description would include the quantity and type of prescribed materials and would be one of the following from the operation's list:

- Completed agreement forms when applicable
- A written description of a non-nutrient destination including location and name of the destination.

The possible destinations are summarized as follows:

1. Prescribed materials are going to be used for nutrient purposes:

   a) They are going to be applied to land according to the nutrient management plan for the same farm unit.

   b) They are going to be transferred to the nutrient management strategy of another operation.

   c) They are going to be transferred to the nutrient management plan of another farm unit through a Nutrient Transfer Agreement.

   d) They are going to be transferred to a broker through a Broker Agreement.

2. Prescribed Materials are going to be managed through non-nutrient purposes.

5.2.4 Storage Information

I. Storage Facilities
Storage facilities on the operations must be listed. For each storage a description is required that gives the capacity, dimensions and type of storage (circular, rectangle, pile, covered, exposed to precipitation, etc). If nutrients that are received are not stored at the operations before they are used then an explanation is required (i.e. custom applied biosolids).

Nutrient storage must comply with the regulations for capacity and siting set out under the Nutrient Management Act.

5.2.5 Contingency Plan and Certification Form

J. Contingency Plan

A written contingency plan is required that outlines alternative actions in the event that the nutrient management strategy cannot be followed. See Part 11 of this Protocol on contingency planning.

K. Certification Form
The certification form serves as a sign-off document for the operation's operator, the person who prepared the nutrient management strategy, and if applicable the OMAF reviewer. The Certification Form is in Part 16 on forms.

Completed Nutrient Management Strategy
The nutrient management strategy is a subset of the printouts that NMAN can provide or the applicable sections of the workbook.

A completed nutrient management strategy would be available for inspection and must include:

1. Certification Form
2. Farm Unit Information (declaration and identifier)
3. Agreements
4. Farm Unit Sketch
5. Minimum Distance Separation II
6. Contingency Plan

Printouts from NMAN or workbook sections:
7. For each farm property a Farm Information sheet (location, roll #,generator or not, name)
8. Manure/Nutrient Source Summary
9. Manure/Nutrient Information (type, analysis etc)
10. Storage Information (Yearly amount, days of storage, amount remaining etc)
11. Storage Sizing Calculations
12. Destination Summary and descriptions

6 Part 6 - Nutrient Management Strategy for Non-Agricultural Generating Operations

6.1 *GENERAL*

A nutrient management strategy accounts for the management of all generated prescribed materials in an environmentally acceptable manner. **All non-agricultural nutrient generators of prescribed materials, that land apply their materials must complete a nutrient management strategy and submit it to MOE's Environmental Assessment and Approval Branch in the prescribed timeframe.**

6.2 *REVIEW AND RENEWAL OF A NUTRIENT MANAGEMENT STRATEGY*

All Nutrient Management Strategies must be renewed every five years or sooner in the event that one of the following situations occurs:

- A change in the legal name of the generator/owner.
- A 20% or more change in the amount of nutrients generated.
- A change in the quality of the materials occurs which affects nutrient content.
- An MOE Provincial Officer orders the strategy to be updated.

6.3 *REQUIRED CONTENTS OF A NUTRIENT MANAGEMENT STRATEGY FOR NON-AGRICULTURAL NUTRIENT GENERATING OPERATIONS*

6.3.1 Facility Description and Approval Information

Part i. Facility Description and Approval Information
The initial part of the strategy includes a description of the operation, such as name of the facility, postal address, a contact name of the operation with their signature (i.e. person responsible for the strategy) and the total annual volume of material generated. The description section also includes the date of submission to the Ministry of the Environment, the approval date, the approving MOE director and their signature and the expiry date of the strategy.

6.3.2 Material Description and Storage Information

Part ii. Material Description and Storage Information
Part ii includes a description of the types of nutrient material produced. The type for example, could include sewage biosolids, paper biosolids or some type of process wastewater. A description of the form of the nutrient such as liquid or solid is also included. Solid prescribed materials contain less than 82% moisture or meet the requirement of the "Slump Test" as defined in EPA Regulation 347. The average annual volume should be given related to the period of the strategy, on an annual basis.

Information on storage of all prescribed nutrients generated at the facility must be given. On and off site storage must be listed with pertinent C of A numbers and their expiry date and the storage capacity.

Nutrient storage must comply with the regulations for construction and siting set out under the Nutrient Management Act. Structural aspects of the storage must meet the standards under the Ontario Building Code.

6.3.3 *Five Year Projected Strategy for Management of Material Generated*

Part iii. Five Year Projected Strategy for Nutrient Material Generated
A five- year volume projection must be included for the various management methods of the nutrient material. Methods include for example, land application, landfill disposal, incineration and processing such as composting. If there is a projected change in volume for any of the management methods, a description detailing why this is projected.

6.3.4 *Nutrient Analysis of Material*

Part iv. Analysis of Nutrient Material
The generator must provide both nutrient content and quality of their material. A laboratory nutrient analysis of heavy metals, odour and pathogens for the prescribed materials must be done to demonstrate compliance with the quality regulations. Although the standards requirements for biosolids are similar to those in the 1996 Biosolids Manual, sampling and testing requirements have been adjusted, based on size and capacity of the facility and the amount of material generated. An analysis must be done within a certain timeframe, and must be provided to the land applicator.

Additional contaminants are presently under review to develop new standards that will be set in regulation.

6.3.5 *Contingency Plan*

Part v. Contingency Plan
A written contingency plan is required the outlines alternative action in the event that the strategy cannot be followed. In this case, the contingency plan will include alternative action to be taken in the event of a storage irregularity or for alternate disposal of the nutrient material.
In the event of a spill, all non-agricultural facilities must follow a spills contingency referred to in Regulation 347, Part IX of the EPA.

6.3.6 *Destination of Material*

Part vi. Destination of Material
The destination of material, known at the time of submitting a NMS, can be summarized as follows:

- Applied to agricultural land with corresponding nutrient management plan numbers or Certificate of Approval (C of A) numbers and the corresponding expiry dates, the approved area in acres, application rate, total volume and site storage capacity, hauler identification (including System C of A numbers or certification numbers).
- Landfill Disposal management information sought will include name of the landfill site, total volume disposed, receiving site C of A numbers and daily, interim and final cover information.
- Incineration volume and whether it is on- or off-site with the C of A numbers if applicable.
- Process method type (such as composting), the total volume, on- and off-site information, and a C of A or nutrient management strategy number if applicable.
- Other management methods must also be documented including a description of the method, total volume disposed, on- and off-site information and a C of A or nutrient management strategy number if applicable.

6.3.7 *Annual Report of Management of Material*

Part vii. Report on Management of Materials Other Over Five Years – Land Application, Landfill, Incineration, Processed
This report requires essentially identical information as Part vi. However, it is the actual information that must be supplied by the generator annually and reported at the end of five years with a new NMS submission for approval by MOE.

The actual destination of the material can be reported as follows:

- Materials applied to agricultural land with corresponding nutrient management plan numbers or Certificate of Approval (C of A) numbers and the corresponding expiry dates, the actual area in acres, application rate, total volume applied and site storage capacity, hauler identification (including System C of A numbers or certification numbers).
- Landfill Disposal management information: name of the landfill site, total volume disposed, receiving site C of A numbers and daily, interim and final cover information.
- Incineration volume and whether it was on- or off-site with the C of A numbers if applicable.
- Processed materials such as composting, the total volume processed, on- and off-site information, and a C of A or nutrient management strategy number if applicable.
- Other management methods must also be documented if utilized including a description of the method, total volume disposed, on- and off-site information and a C of A or nutrient management strategy number if applicable.

6.3.8 Report on Five – Year Strategy for Material Generated

Report on Five Year Strategy of Nutrient Materials Generated
This report is similar in information requested as Part iii. A five-year volume of actual material must be included for the various management methods of the material. Methods include for example, land application, landfill disposal, incineration and processing such as composting. If there is a change from the strategy in volumes for any of the management methods, a description detailing why must be included.

7 Part 7 - Nutrient Management Plan

7.1 *REVIEW AND RENEWAL OF A PLAN*

A nutrient management plan should be **reviewed** by the farm unit operator annually to ensure that it is still relevant and to recognize and account for any deviation from the plan indicated in records kept of actual events.

All nutrient management plans must be **renewed** every five years. Renewal means to make amendments to the nutrient management plan to account for changes over the last five years and to prepare for events over the next five years. Should any of the following situations occur than the nutrient management plan must be renewed at that point, which is before the end of the five-year cycle.

Situations requiring early renewal of a nutrient management plan:

- The end of a year in which there is an increase of 20% or more in the quantity of prescribed materials received at the farm unit since the first year of the nutrient management plan;
- The end of a year in which, due to a change in the cropping system at the farm unit for there is a decrease of 20% or more in crop removal of nitrogen and phosphorus provided by the nutrients received since the first year of the nutrient management plan. The "Chart Showing Groups of Crops with Equivalent Crop Removals" will help to determine when this has occurred and this chart is being developed; or
- The end of a year in which there is a decrease in land available for the application of prescribed materials on the farm unit of more than 10%, amounting to a decrease of at least 2 hectares since the first year of the nutrient management plan.

7.2 *REQUIRED CONTENTS OF A NUTRIENT MANAGEMENT PLAN*

7.2.1 Farm Unit Information

A. Description of the Operation
The description should give the type of agricultural operation covered in this nutrient management plan (i.e. cash crop, greenhouse, etc). This brief summary of the farm unit should give the following information:

- Any unusual details or issues requiring additional explanation,
- Indicate if the nutrient management plan is new or a renewal, and
- Identify corresponding strategies by the operation Identifier.

B. Farm Unit Declaration Form
For an agricultural operation there is a required Farm Unit Declaration. It identifies the contact information for the farm unit operator and identifies the facilities and landbase associated with the operation. The Farm Unit Declaration is described in Part 2 of this protocol and can be completed using either the Farm Unit Declaration Form or generated using the farm unit Screen in NMAN.

C. Agreements
Agreements are necessary to demonstrate two types of events.
- an operation is, for a specified period of time, in control of a certain identified landbase,
- nutrients are being transferred from one operation to another, which results in a change in the quantity of nutrients that each operation must account for in their nutrient management strategy.

Agreements must be signed and attached to the nutrient management strategy. There are three types of agreements recognized by the regulations and they can be found in Part 16 of this protocol. They are

Type of Agreement	Details
Broker Agreement	A broker agreement represents either a transfer from a generator to a broker or a transfer from a broker to a receiver. Each party to the agreement needs a signed copy. The broker must have the identifier of each generator or receiver they have an agreement with.
Nutrient Transfer Agreement	This form indicates that nutrients are being transferred to or from an operation and implies that that the nutrient management strategy and/or plan of each operation reflects that transfer.
Manure /Biosolid Application Agreement	This agreement documents the provision to apply nutrients to land that is not owned by the operator of the operation doing the nutrient management strategy. This agreement implies that for the duration of the agreement the land covered by the agreement becomes part of the farm unit that is applying the nutrients. It is therefore also part of the farm unit Declaration of that farm unit.

D. Farm Unit Sketch
Maps or sketches can be hand drawn, photos, or computer generated. A farm unit operator may choose to do more than one sketch if it isn't possible to show the land belonging to the farm unit on one sketch or if there is too much information for one sketch. NMAN has placeholders for scanned images or links to picture files. Every map or sketch should be neat and readable and be presented with the direction north to the top of the page, denoted by a north arrow.

The sketch must address (either include or state that they don't' exist) the following items:

Location of all the landbase declared in the farm unit:
- Land that is owned or they have Manure/Biosolid Application Agreements for.

- Road names, municipality boundaries, neighbours, and other local features

Location of generation facilities and storage(s):
- Permanent, temporary and proposed generating facilities
- Permanent, temporary and proposed storage facilities
- Distance between facilities and distance to other buildings
- Dimensions of all facilities

Location of sensitive features:
- Known wells (includes gas, oil, test and water wells)
- Municipal wells
- Tile inlets
- Surface water (as defined in Part 9 of this Protocol)
- Residences and other designated health or educational facilitys (as defined in Part 9 of this Protocol)

7.2.2 Nutrient Information

F. Prescribed Materials Applied to Land in the Farm Unit
For all prescribed materials destined to be land applied on this farm unit, the nutrient management plan must include the following information.

- Type/name of the prescribed material
- Form of the prescribed material: liquid or solid (Solid prescribed materials contain less than 82% moisture or meet the requirement of the "Slump Test" as defined in EPA Regulation 347).
- Quantity of prescribed material.
- Nutrient Analysis of the prescribed material

And if received:
- Date it is received
- Identifier of the source of the prescribed material with the corresponding agreements.

Note: For farm units who are just users of nutrients (ie do not generate) the sum of the quantity(s) of prescribed material(s) to be land applied on the farm unit must be equal to the quantity of prescribed materials received on the farm unit that are destined for land application.

G. Nutrient Sampling and Analysis
All nutrient analyses are to be performed according to the Sampling and Analysis Protocol outlined in Part 14 of this Protocol.
- All prescribed materials must meet Nutrient Quality standards protocols (Part 13) to ensure they can be applied to agricultural land.
- All Commercial Fertilizers used in a nutrient management plan must identify the guaranteed N-P-K analysis of the formulation.
- The nitrogen, phosphorus and potassium content for all prescribed materials must be given.

- If a laboratory nutrient analysis is supplied for a prescribed material, then it must be completed within the last 5 years.
- The nutrient content of a laboratory nutrient analysis for manure must be within 30% of the NMAN data bank averages, or documentation must be included explaining the differences.

I. Storage Information
A list of all storage facilities on the farm unit must be compiled. If some or all of the nutrients are not stored on the farm then a written justification is necessary.

Nutrient storage facilities must comply with the regulations for capacity and siting. For each storage facility a description is require that gives the dimensions, capacity, type of storage (circular, rectangle, covered, open, etc.) and any other special features.

J. Contingency Plan
A written contingency plan is required as described in Part 11.

K. Certification Form
The certification form serves as a sign-off document for the farm unit operator, the person who prepared the plan, and the OMAF reviewer. See Part 16 on forms.

7.2.3 Field Information

A field can be broken down into sections to reflect individual management zones. Each field is considered to include at least one section. Components M – T must be included for every field section identified in the nutrient management plan. All land identified in the farm unit must be included in a field section.

L. Field Properties
The following field properties must be given in the nutrient management plan for each field identified in the farm unit:

1. The total tillable acreage for each field must be given.
2. The total tillable acres available for nutrient application must be given. Note: Determined by subtracting the area not available for nutrient application due to required setbacks from the total tillable acres for each field.
3. If field is within 500 feet of a surface water, then percent slope near the watercourse
4. If field is tile drained
5. Maximum field slope
6. If bedrock is less than 3 feet from the surface
7. Minimum depth to groundwater
8. If field has a minimum of 10 feet buffer strip already in place next to a surface water Soil Texture as described in NMAN
9. Soil Series as described in OMAF Publication 29

M. Field Sketch

Many of the Field Properties are required in the format of a sketch for each field in the farm unit. The sketch must address the following field components:

1. Field identifier/name (from Farm Unit Declaration)
2. Identity of sections within the field, the field has more than one section
3. Indicate presence of drainage tiles

As defined in Part 9 of this Protocol, Common Land Application Standards of this Protocol the following features must be included on the sketch:
4. Location of all Surface Water
5. Location of all Residential Areas and other Designated health or educational facilitys
6. Location of all wells within 100 feet of field boundary
7. Minimum Depth to Groundwater
8. Minimum Depth to Bedrock
9. Slopes within 500 feet of all surface water and any separation distances required due to the Phosphorus Index
10. Indicate adequate separation distances for items #3-5.

If any of the items listed do not exist for the field then the sketch must have a written comment to indicate that they are not present (e.g. "This field is not tiled.").

N. Soil Sampling and Analysis
All fields require a soil analysis to balance available nutrients. The analysis' are to be performed according to the Sampling and Analysis Protocol outlined in Part 14 at least once every 3 years. If biosolids are going to be applied to a field than the soil analysis must include an analysis of metals as required by the regulations.

7.2.4 Cropping Practices

O. Crop Rotation and Yields
The following information is required for each field in the nutrient management plan.

- Crop rotation for the duration of the nutrient management plan
- Expected planting and harvest dates
- Expected crop yields for the duration of the nutrient management plan
- Previous years crops and their yield

Yield Documentation for Continuous Cropping
Documentation supporting stated yields is required for fields where the same crop is grown continuously for 3 or more years on the same field and the estimated yield exceeds township averages.

Yield Documentation for High Yields
Documentation supporting stated yields is required for fields where the estimated crop yields exceeds 120% of the township average and/or provincial average. Crop insurance records and NISA statements are examples of suitable documentation

P. Tillage Practices
The following information must be included for all fields in the nutrient management plan.

- Tillage Method
- Tillage Practice
- Expected date of tillage
- Length of Slope

7.2.5 Nutrient Application

Q. Commercial Fertilizer Application
So far in the nutrient management plan Commercial Fertilizer application has not been addressed. All liquid and solid Commercial Fertilizer applied, for the entire duration of the nutrient management plan, must be identified. This includes but is not limited to: starter, pop-up, side-dressed, broadcast, banded, foliar, fertigated, incorporated or unincorporated applications.

For each application the expected date, rate and method is required as well as the ratio/mix of nutrients in the Commercial Fertilizer.

R. Application of Prescribed Materials and Limits
For each prescribed material listed in component G above – "Prescribed Materials Used on farm unit" the nutrient management plan must identify the following for the entire duration of the nutrient management plan:

- Prescribed Material Type and Form
- Expected application date
- Application method
- Timing to incorporation
- Application Frequency
- If nitrogen is expected to be applied in the fall after a crop is harvested

7.2.6 Nutrient Application Limits
The rate of application for each prescribed material is on a field (section) by field basis given the land application standards and the information already inputted about the field/section and the cropping practices.

S. Agronomic and Crop Removal Balance of Nitrogen

Agronomic Application Limits for Nitrogen
To determine the agronomic application limits for nitrogen to a field calculate the agronomic balance, and if applicable, calculate the N-Index to determine maximum allowable application rates for nitrogen.

The Agronomic Balance Calculation for Nitrogen

Agronomic Balance is the total available nitrogen from all applied sources, including all prescribed materials and commercial fertilizers, minus crop production requirements.

Agronomic Balance Calculation and Limits for Nitrogen are described in the Nutrient Management Workbook.

T. Nitrogen Index
The N-Index is a tool for limiting nitrate nitrogen movement below the root zone in agricultural fields. It assesses the vulnerability of nutrient management practices with respect to the movement of nitrates in groundwater. It is based on nutrient management practices and characteristics of the soil.

There are two triggers that require the completion of the N-Index:
- nitrogen is applied in excess of the agronomic balance
- nitrogen is applied in the fall after crop harvest

The N-Index calculation is a Four-Step Process and is described in the Nutrient Management Workbook.

U. Application Limits for Phosphorus
To determine the application limits for phosphorus to a field calculate the agronomic balance and if applicable the crop removal balance to determine the maximum allowable application rate of phosphorus to a field. If your soil test for phosphorus is greater than 30, calculate the P-Index to determine required separation distances from water sources.

The Agronomic Balance Calculation for Phosphorus
Agronomic Balance is the total available phosphorus from all applied sources minus crop production requirements. This calculation is described in the Nutrient Management Workbook.

V. Phosphorous Index
The P-Index must be completed for all fields that have a soil test phosphorus level greater than 30 ppm. The P-Index will determine separation distance requirements for phosphorus application from surface water.

The P-Index is a tool for limiting phosphorus movement into surface water from agricultural fields. This tool is to be used in the context of nutrient management planning. The P-Index can be completed using the Nutrient Management Workbook, the NMAN computer program developed by OMAF, or OMAF Factsheet 98-079.

W. Common Land Application Setback/Limits

The following land application standards must be considered to determine the application rate and land available for application in each field/section. The requirements for these are in the regulation and the definition of them is in Part 9 of this Protocol.

1. Liquid Loading Limits
2. Tile Drainage Monitoring

3. Setbacks from Wells
4. Setbacks from Surface Water
5. Setbacks from Designated health or educational facilities
6. Winter Spreading Limits
7. Bedrock and Groundwater Separation

7.2.7 *Landbase Information*

X. Demonstration of Adequate Landbase
The nutrient management plan must demonstrate that sufficient landbase exists for the application of all the nutrients identified that are being applied such that none of the allowable application limits are exceeded and all of the setbacks are met.

Complete Nutrient Management Plan
Only those parts of a nutrient management plan that are required to demonstrate compliance will need to be submitted for approval or kept on file. The nutrient management plan that would be available for inspection and submitted for approval or certification would include:

1. Certification Form
2. Agreements
3. Farm Unit Sketch
4. Field Sketches
5. Soil Test results
6. Contingency Plan
7. Any additional documentation required for the nutrient management plan (yield documentation)

8. Printouts from NMAN or workbook sections:
a) Farm Unit Information (declaration and identifier)
b) For each farm property a Farm Information sheet (location, roll #,generator or not, name)
c) Manure/Nutrient Source Summary
d) Manure/Nutrient Information (type, analysis etc)
e) Storage Information (Yearly amount, days of storage, amount remaining etc)
f) Manure/Nutrient Application Graph (tracks total (all types) amount remaining)
g) Manure/Nutrient Application Summary (for each field/section the rate, amount, method, setback)
h) Manure Storage Sizing calculations
i) Field Summary (field identifier, soil info, area, crop type, # of nutrient applications, flags)
j) Flag Summary (Flags are indicators of non-compliance or missing information)

8 Part 8 - Short Version NUTRIENT MANAGEMENT STRATEGY and NUTRIENT MANAGEMENT PLAN Criteria for Agricultural Operations

8.1 *GENERAL*

For category 1,2,5,7, and 8 farm units there is the possibility of preparing a short form nutrient management strategy and/or plan. However, if the operation is applying biosolids, this option is not available to them – a full nutrient management plan must be done and submitted to OMAF for review and approval. To do so the farm unit must be able to comply with every point in section 8.2. The operator of a farm unit with a short version nutrient management strategy or plan is not exempt or excused from following all the other requirements for farm units set out under the regulations of the Nutrient Management Act.

- Short Version nutrient management strategy/plan is based on a farm unit and must include a farm unit Declaration Form.
- Short Version nutrient management strategy/plan must be kept on the Farm and be available for reference and inspection purposes.
- Short Version nutrient management strategies/plans can be done as required by category phase in.

8.2 *CRITERIA/COMPONENTS OF A SHORT VERSION NUTRIENT MANAGEMENT STRATEGY AND/OR PLAN*

An operator must be able to answer "YES" to all of the questions below to satisfy the eligibility requirements for a Short Version nutrient management strategy/plan. If the operation can answer yes to all of the questions then this sheet of questions, when signed becomes the nutrient management strategy/plan for the operation. If the answer is "NO" to **any** of the questions, then a full nutrient management strategy and or nutrient management plan must be completed.

This is the short version for farmers generating or receiving manure. Short versions for category 5,7 and 8 will be developed.

Write the Operation Identifier here:	**Yes or No**
1. Does this farm unit have a completed farm unit Declaration and indicate the operation identifier?	
2. Does the operator of this farm unit have proof that a minimum level of education or training in Best Management Practices has been attained (to be defined)?	
3. Does this farm unit only use on-farm generated nutrients and/or commercial fertilizer farms and/or other materials specified for inclusion in the criteria for short	

version Nutrient Management Strategies/ Plans by the Director?	
4. This farm unit does not apply biosolids?	
Does this farm Generate Nutrients? If so complete question 5, if not go to question 6.	
5. This farm unit is a generator of manure. Does it…	
a) Belong in category 1or2?	
b) Manage only on-farm generated solid manure, including run-off from that manure?	
c) Generate less than 1.5 NU per tillable ha on the farm unit?	
d) Have a completed MSTOR or equivalent evaluation?	
e) Have one of the following: • a minimum of 240 days storage with run-off control or treatment, or • storage as above for the confinement period of livestock confined for less than 240 days, or • a Broker Agreement to compensate for storage capacity less than the required period, or • proof of an arrangement with an Intermediate Generator to compensate for the storage capacity less than the required period?	
Does this farm unit receive nutrients? If so complete question 6, if not go to question 7.	
6. This farm Unit is a receiver of manure and it… a) Receives less than 1.5 NU/ha?	
b) Meets all requirements for temporary storage?	
If this farm unit applies nutrients to land answer question 9, if it doesn't go to question 10.	
7. This farm unit applies nutrients to land. Does it…	
a) Only apply solid manure with application rates <7t/ha poultry manure or <22t/ha for other solid manure on all fields?	
b) Comply with all land application regulations (setbacks, adequate spreading conditions, etc.)?	
c) Apply nutrients to land at rates less than 15 kg/ha above OMAF Crop Fertilizer Recommendations?	
8. Does the farm unit have a contingency plan completed that follows the guidelines set out in this Protocol?	
9. Will you reassess your farm unit based on this set of criteria at least every 5 years and renew your nutrient management strategy/plan accordingly?	
10. Is the operator of this farm unit free from violation under the Nutrient Management Act within the last five years?	
Signature of Operator	**Date**

9 Part 9 - Common Land Application Protocols

The regulations for land application of nutrients determine when spreading may occur, and under what conditions it is appropriate. The rate of application is dependent on individual site characteristics. Requirements with respect to sensitive features, setbacks and times when no application can occur are given in the regulations, with the following expanded guidelines. Unless a phase-in is specified in the regulation, these requirements come into effect as soon as the regulation is filed.

9.1 *APPLICATION RATES FOR LIQUID PRESCRIBED MATERIALS*

Liquid materials should not be applied at rates where the material would run off the application site. The maximum application rate is defined by the runoff potential of the site, which in turn depends on the field slope and the permeability of the soil. The risk of runoff is much greater from a sloping field than from a level one, and from a clay soil than from a gravelly soil. These relations are described in the following tables.

9.1.1 Single Application Liquid Loading Limit

Runoff potential (see Table 2)	Maximum application rate if applied to the surface of land	Maximum application rate if injected, incorporated[1] after application or applied to pretilled[2] land
High	50 m^3/ha	75 m^3/ha
Moderate	75 m^3/ha	100 m^3/ha
Low	100 m^3/ha	130 m^3/ha
Very Low	130 m^3/ha	150 m^3/ha

[1] Incorporation must occur within 24 hours of manure application.
[2] Pretillage must have occurred no more than 7 days prior to manure application.

9.1.2 Runoff Potential

Soil hydrologic group (see Ontario Ministry of Agriculture and Food Ontario Drainage Guide)	Maximum sustained field slope within 150 m of watercourse			
	< 3 %	3 - 6 %	6 – 9 %	9 – 12 %
A (Rapid)	Very Low	Very Low	Low	High
B (Moderate)	Very Low	Low	Moderate	High
C (Slow)	Low	Moderate	High	No Application
D (Very Slow)	Moderate	High	High	No Application

Application of liquid prescribed materials is not allowed on land with slope greater than 12%.
Note: Slope as a percentage is another way of expressing rise over run. Ie 12/100 is 12%

9.2 *LAND WITH TILE DRAINAGE*

When liquid materials are applied to land with tile drainage, the quality of the tile water leaving the field must be monitored, if possible. If it is not possible to monitor the tile water, then either the field must be pre-tilled within seven days before manure application, or the application rate must be below 40 cubic meters per hectare.

There must also be a contingency plan for liquid application on land which is tile drained. When monitoring demonstrates that liquid prescribed materials are in the tile, then the contingency plan must be implemented. This plan must outline the actions required to stop the release from the tile, and either contain the contaminated water or direct it to an area for treatment or absorption into the soil.

9.3 *SETBACKS*

9.3.1 Setbacks from Private Wells

The construction and siting standards for wells are covered under Regulation 903 of the Ontario Water Resources Act. In addition, setbacks for the land application of nutrients are specified in the Regulation to the Nutrient Management Act. The definition of wells in the regulation includes water wells, oil wells, gas wells and test wells.

9.3.2 Setbacks from Municipal Wells

Because of the greater exposure to water drawn from a municipal well than from a private well, there are more stringent limitations to land application near a municipal well. No nutrients are to be applied within 100 meters of any municipal well. In addition, within the two year time of travel zone to a municipal well, the soil must be pretilled before the application of liquid prescribed materials, or the rate of application must be less than 40 cubic meters per hectare. The rate of nitrogen application will be limited by the nitrogen index. For this purpose, the soils within the two year time of travel zone will be treated as if the hydrologic soil group were one category higher (that is, a "B" soil would be treated as if it were an "A" soil) than the category defined for the soil type in that area.

9.3.3 Setback from Surface Water

The minimum setback from the top of the bank adjacent to surface water is defined in the regulation. There may be wider setbacks required in the nutrient management plan by the Phosphorus Index or the material application rate, in which case the wider setbacks would take precedence.

"Surface Water" is defined as:

a natural or artificial channel that carries water continuously or intermittently throughout the year, and if intermittently has established vegetation within the bed of the channel that is not dominated by terrestrial plants. It also includes lakes, reservoirs, ponds, sinkholes, or wetlands. It does not include grassed waterways, temporary channels for surface drainage (furrows or shallow channels that can be tilled and driven through), rock chutes and spillways, roadside ditches (not meeting the definition for a continuous or intermittent stream) or temporarily ponded areas that are normally farmed.

"Wetland" is defined as land such as a swamp, marsh, bog or fen (not including land that is being used for agricultural purposes and no longer exhibits wetland characteristics) that,

(a) is seasonally or permanently covered by shallow water or has the water table close to or at the surface,

(b) has hydric soils and vegetation dominated by hydrophytic or water-tolerant plants, and

(c) has been further identified, by the Ministry of Natural Resources or by any other person, according to evaluation procedures established by the Ministry of Natural Resources, as amended from time to time.

"Terrestrial plants" are defined as those species that are not hydrophytic. They would normally occupy lands that are not subject to inundation for more than short periods.

"Top of bank" is defined as the edge of a defined channel where there is a sharp change from the steep slope of the channel to the shallower slope of the field area; or where no such break in slope exists, the normal bank-full extent of the watercourse when it is carrying the maximum volume of water without flooding.

9.3.4 Setback from Residences and Designated Health or Educational Facilities

Setbacks from residences or designated health or educational facilities are specified in the regulations. Setbacks are measured from the nearest wall of a residence, or from the property line of a designated health or educational facility.

Definition of Residential Area: Four or more residential buildings on adjacent lots, generally one hectare or less in size sharing a common boundary. Lots located directly across the road from one another are considered as having a common boundary.

The definition of a "designated health or educational facility" is taken from Ontario Regulation 505/01, under the *Ontario Water Resources Act*, with the exception that it does not include land used for a school while the school is not in session. The definition does include:

- a delivery agent care facility,
- a health care facility,
- a school or private school, during that time of year when the school is in session
- a social care facility,

- a university, a college of applied arts and technology, or an institution with authority to grant degrees;

"day nursery" means a day nursery as defined in the *Day Nurseries Act*;

"delivery agent care facility" means,
- a place where an emergency hostel service that receives funding under the *Ontario Works Act, 1997* is provided,
- a domiciliary hostel that receives funding under the *Ministry of Community and Social Services Act*,
- a place where a resource centre program that receives funding under the *Day Nurseries Act* is provided, or
- a place where a recreational program that receives funding under the *Day Nurseries Act* is provided;

"health care facility" means a facility that provides overnight accommodation and that is,
- a hospital within the meaning of the *Public Hospitals Act* or the *Community Psychiatric Hospitals Act*,
- a private hospital within the meaning of the *Private Hospitals Act*,
- a psychiatric facility within the meaning of the *Mental Health Act*,
- a nursing home within the meaning of the *Nursing Homes Act*,
- a home within the meaning of the *Homes for the Aged and Rest Homes Act*,
- an approved charitable institution within the meaning of the *Charitable Institutions Act* that is approved under section 3 of that Act as,
- a halfway house where rehabilitative residential group care may be provided for adult persons,
- a home for the aged, or
- a home where residential group care may be provided for handicapped or convalescent adult persons,
- a cancer centre established by the Ontario Cancer Treatment and Research Foundation under the *Cancer Act*,
- a home for special care within the meaning of the *Homes for Special Care Act*,
- an approved home within the meaning of the *Mental Hospitals Act*,
- a commercially operated residence for seniors or retired persons, or any other similar commercially operated residence, where attainment of a mature age is a factor in being accepted for occupancy,
- a nursing station, health centre, clinic or other facility that receives funding through the Ministry of Health and Long-Term Care's Underserviced Area Program, or
- a facility owned or leased by a person who receives funding from the Ministry of Health and Long-Term Care for one or more of the following health care support services that are provided to or are available to residents of the facility:
- a residential treatment services program,
- a withdrawal management services program,
- a dedicated supportive housing project;

"private school" means a private school as defined in the *Education Act*;

"school" means a school as defined in the *Education Act*;

"social care facility" means,
- a facility designated by the regulations under the *Developmental Services Act* as a facility to which that Act applies,
- a residence licensed as a children's residence under the *Child and Family Services Act*,
- a facility where child development services, child treatment services, child welfare services, community support services or young offenders services, within the meaning of the *Child and Family Services Act*, are provided, unless the facility is located in a private residence,
- a facility where child and family intervention services, within the meaning of Regulation 70 of the Revised Regulations of Ontario, 1990 made under the *Child and Family Services Act*, are provided, unless the facility is located in a private residence,
- a place where an emergency shelter service that receives funding under the *Ministry of Community and Social Services Act* is provided, unless the place is located in a private residence,
- a day nursery,
- a sheltered workshop that receives funding under the *Developmental Services Act* or the *Ministry of Community and Social Services Act*,
- a place where a supported employment program that receives funding under the *Developmental Services Act* or the *Ministry of Community and Social Services Act* is provided,

- a place where an adults' community support service that receives funding under the *Developmental Services Act* is provided, unless the place is located in a private residence,
- a place where an employment preparation, training and job placement program that receives funding under the *Developmental Services Act* or the *Ontario Disability Support Program Act, 1997* is provided,
- a place where a violence against women program that receives funding under the *Ministry of Community and Social Services Act* is provided, unless the place is located in a private residence,
- a place where an aboriginal healing and wellness program is provided;

"school" means a school as defined in the *Education Act*;

"social care facility" means,
- a facility designated by the regulations under the *Developmental Services Act* as a facility to which that Act applies,
- a residence licensed as a children's residence under the *Child and Family Services Act*,
- a facility where child development services, child treatment services, child welfare services, community support services or young offenders services, within the meaning of the *Child and Family Services Act*, are provided, unless the facility is located in a private residence,
- a facility where child and family intervention services, within the meaning of Regulation 70 of the Revised Regulations of Ontario, 1990 made under the *Child and Family Services Act*, are provided, unless the facility is located in a private residence,
- a place where an emergency shelter service that receives funding under the *Ministry of Community and Social Services Act* is provided, unless the place is located in a private residence,
- a day nursery,
- a sheltered workshop that receives funding under the *Developmental Services Act* or the *Ministry of Community and Social Services Act*,
- a place where a supported employment program that receives funding under the *Developmental Services Act* or the *Ministry of Community and Social Services Act* is provided,
- a place where an adults' community support service that receives funding under the *Developmental Services Act* is provided, unless the place is located in a private residence,
- a place where an employment preparation, training and job placement program that receives funding under the *Developmental Services Act* or the *Ontario Disability Support Program Act, 1997* is provided,
- a place where a violence against women program that receives funding under the *Ministry of Community and Social Services Act* is provided, unless the place is located in a private residence,
- a place where an aboriginal healing and wellness program is provided;

9.4 *WINTER APPLICATION*

Application of nutrients during the winter is undesirable because there is no growing crop to absorb the applied nutrients, and there are often conditions that could lead to the runoff of applied materials into surface water. Restrictions to the application of nutrients during the winter are outlined in the regulation.

9.5 *BUFFER ZONES*

Permanent vegetation in a buffer zone adjacent to surface water slows down the movement of runoff into surface water, filters out sediment and other particulate matter, and absorbs nutrients that would otherwise enter the surface water. These will all have a positive effect on surface water quality. The regulations require that all surface water be bordered by a vegetated buffer zone with a minimum width of three meters, measured from the top of the bank. This requirement is phased in, so that a farmer is required to have vegetated buffer zones at the same time as he is required to complete a

nutrient management plan. Until the buffer is established, nutrient applications are subject to a wider setback from surface water.

Definition of Vegetated Buffer Zone
For the purposes of this regulation, a vegetated buffer zone is defined as an area that is maintained under continuous vegetated cover (perennial grasses, forbs or trees, including perennial forage crops that are harvested as hay or silage), adjacent to surface water sources.

9.6 *BEDROCK AND GROUNDWATER*

9.6.1 Minimum Depth to Bedrock

Fractured bedrock is present under most of Ontario's farmland. The overburden normally provides filtering of contaminants before it reaches this depth, but there are areas where the thickness of the overburden is not sufficient to provide this protection. Contaminants that reach the bedrock can move downward into an aquifer with no restriction. Limits to the application of prescribed materials help to minimize this risk.

Application of non-agricultural source materials is not allowed on land with less than 1.5 meters of soil over bedrock, unless approved by the director of MOE.

Application of manure and other agriculture source material is allowed, subject to the limitations outlined in the regulation. The limits are applied relative to the shallowest soils over bedrock in the area of application.

9.6.2 Minimum Depth to Groundwater

Definition of Permanent Water Table: The shallowest zone in the soil which normally has positive water pressure, as recorded in the water well records for the nearest water well, or as determined by a test hole dug during the summer months.

"Unsaturated soil condition" can be tested by digging a hole or removing a soil core to a 30 cm depth, and observing whether water flows into the hole from the surrounding soil. Water will only flow under saturated conditions, so if water is observed the soil does not meet the criteria for nutrient application.

9.7 *PRE-HARVEST WAITING PERIOD*

Restrictions on the harvest of various crops following the application of non-agriculture source materials are listed in the regulation.

The food industry is very conscious of food safety, and has been very pro-active in specifying the minimum periods between manure application and harvest for food crops. They will not buy produce that does not meet their criteria. This is a more effective deterrent than any regulation.

9.8 *INCORPORATION REQUIREMENTS BASED ON ODOUR CRITERIA*

The incorporation requirements for prescribed materials, based on how odourous the material is, and the distance to a residence or designated health or educational facility, are listed in chart below. Additional requirements for municipal biosolids are set out in the regulation.

This chart applies to all prescribed materials other than municipal biosolids.

Material Odour Rating	Distance to Residence or Residential Area		
	<25 M to single residence <50 m to residential area or designated health or educational facility	25 to 90 m to single residence 50 to 450 m to residential area or designated health or educational facility	> 90 m to single residence > 450 m to residential area or designated health or educational facility
O1	No application	Incorporation recommended, except on hay or pasture	No restrictions
O2	No application	Incorporation required within 24 hours of application	Incorporation recommended, except on hay or pasture
O3*	No application	Incorporation required within 6 hours of application. Direct incorporation or injection recommended.	Incorporation required within 24 hours of application.* Direct incorporation or injection recommended.

*High Odour materials may be spread on pasture or hayland where techniques that ensure the manure is placed below the vegetative cover are employed (e.g., low-pressure ground level application, sleigh foot applicator, etc). Separation distances from residences, residential areas and high conflict land uses apply.

Note: Odour Criteria are described in Part 14.8 of this Protocol.

10 Part 10 – Outdoor Livestock Feeding Operations

10.1 CLASSIFICATION OF OUTDOOR LIVESTOCK FEEDING OPERATIONS

Outdoor feeding operations are classified as either seasonal or permanent. Both seasonal and permanent operations are further classified as either high density or low density based on a simple body count as follows:

Seasonal (less than 200 days of the year in confinement area)

High density: More than 5 Nutrient Units per hectare per year (NU/ha/yr).

Low density: 5 or less Nutrient Units per hectare per year (Nu/ha/yr).

Permanent (200 days of the year or more in confinement area)

High density: 0.012 or more Nutrient Units per metre squared (NU/m^2).

Low density: less than 0.012 Nutrient Units per metre squared (NU/m^2).

New and Expanding for an outdoor livestock feeding operation is defined as an increase of 20% in either:

- number of animals (or equivalent in NU)
- amount of manure produced
- the animal density

over the course of one production year that is not reflected in an approved nutrient management strategy

10.1.1 Seasonal: Annualization of Nutrient Units per Hectare

Nutrient units per hectare per year will represent animal density for **seasonal** outdoor feeding operations. It is a method for determining nutrient deposition that is based on the duration that the livestock is present. The total nutrient units per hectare are calculated using the appropriate NU values for the livestock from the tables in Part 3 of this protocol. This value is then adjusted to adequately reflect how long the livestock was actually on those hectares.

Example of Low Density

One hundred beef cows are wintered on a field of 10 hectares for 120 days. From the NU table it is determined that 1 beef cow equals 1 NU.

100 beef cows = 100 NU

so: 100 NU is on 10 ha which = 10 NU/ha

120 days is approximately 1/3 or (33%) of a year, therefore, the NU loading for this field over the course of this year (provided that there is no other period of the year that livestock is present) is:
10 NU/ha x .33 = 3.3 NU/ha/yr

3.3 NU/ha/yr is less than 5 NU/ha/yr so this is a low-density seasonal feeding operation this year.

Example of High Density

Three hundred ewes (meat sheep) are wintered on a field of 2 hectares for 180 days. From the NU table it is determined that 8 ewes equal 1 NU.

300 ewes / 8 ewes per NU = 37.5 NU
so: 37.5 NU is on 2 ha which = 18.75 NU/ha

200 days is approximately 49% of a year, therefore, the NU loading for this field over the course of this year (provided that there is no other period of the year that livestock is present) is:
18.75 NU/ha x .49 = 9.2 NU/ha/yr

9.2 NU/ha/yr is more than 5 NU/ha/yr so this is a high-density seasonal feeding area this year.

10.1.2 Permanent: Nutrient Units per Square Metre

Example of low density

100 beef cows are kept on 1 hectare for 250 days. From the NU table it is determined that 1 beef cow equals 1 NU so there are 100 NU per ha.

One hectare equals 10,000 m2 so…

100 NU/ha equals 0.010 NU / m2 which is less than 0.012 so this is a low-density permanent outdoor feeding area.

Example of high density

450 beef feeders are kept on 1 ha for 250 days. From the NU table it is determined that 3 beef feeders equal 1 NU so there are 150 NU per ha.

One hectare equals 10,000 m2 so…

150 NU/ha equals 0.015 NU/ha, which is more than 0.012 so this is a high-density permanent outdoor feeding area.

10.2 STORAGE

The floor of an outdoor livestock confinement area is considered to be a manure storage. This is reflected in the siting requirements for the different outdoor livestock confinement area classes, such as the requirements for specified soil type and depth. Furthermore, no additional storage should be needed provided that manure is land applied directly from the outdoor livestock confinement area according to a nutrient management plan.

If manure is removed from that floor before being land applied (according to a nutrient management plan) then the storage where it is kept must also meet the requirements for construction and siting of storage facilities.

Minimum Distance of Separation and Spatial Separation

For seasonal outdoor livestock confinement areas, static minimum measurements by operation category are detailed in the regulation, as are spatial separation distances to specific features such as wells.

For permanent outdoor livestock confinement areas, the regulations for manure storage siting apply. This relates to all spatial separation from features such as wells and tiles, as well as the application of the MDS II formula for odour purposes. This distance calculated for the operation by MDS II will be measured from any areas that livestock are routinely confined such as pens, to the conflicting land use such as residences.

11 Part 11 – Contingency Planning

11.1 *GENERAL*

The contingency plan is drawn up in advance so that they can be implemented on short notice. They are a required component of both nutrient management strategies and plans and must be tailored to that particular operation's conditions. Key people in every operation should be familiar with the contingency plan and how to implement it.

Contingency plans should detail and outline the equipment that is available if and when a spill should occur (i.e. loader tractors, emergency storage trailers, etc). They must also include emergency contacts, such as the owner/operator (who can authorize expenditures), The Spills Action Centre, at 1-800-268-6060, and the local municipality (who can be contacted for drainage information and for assistance in spill response). The 911 address or specific lot and concession of the farm unit should also be known, in order to assist emergency personnel attending the scene.

Emergency and first aid equipment should be listed-i.e. fire extinguishers, hoses and outside water taps, sand or other absorbents.

Location of sensitive storage areas should be known in the event of a fire, such as fuel storage and pesticide/fertilizer storage. The local fire department or fire prevention office can assist with this.

All contingency plans enacted may involve a significant change to either your nutrient management strategy or plan in which case you should refer to Part 5 and 7 of this Protocol on updating these documents.

When the situation requiring the use of the contingency plan is taken care of, re-evaluate your contingency plan to determine what improvements are needed, and what you were not prepared for and make changes accordingly.

When the implementation of a contingency plan causes you to change any aspect of your nutrient management strategy or plan then it is important to assess the significance of the change and determine whether or not a renewal is necessary.

11.2 *MORE NUTRIENT THAN THE NUTRIENT MANAGEMENT STRATEGY OR PLAN HAVE BEEN PREPARED TO DEAL WITH*

1. If the application rates for nutrients in your nutrient management plan are not at their maximum you can review the nutrient management plan and try to increase the application rate and maybe frequency for certain fields/sections. Any changes to the nutrient management plan must be

recorded to reflect the actual amount of nutrient applied. In some cases this may mean a renewal of the nutrient management plan is necessary.

2. If the application rates for nutrients in your nutrient management plan are at the maximum then the operation must be prepared to set up alternate uses for the nutrient. Possibilities include:

- Find a broker who can take it and complete a Broker Agreement
- Find an intermediate generator who will accept it
- Acquire more land through ownership or Manure/Biosolid Application Agreement
- Non-agricultural operators may consider other disposal methods such as landfill, composting, incineration or other processing methods.

11.3 *MORE NUTRIENT THAN THE STORAGE CAPACITY WAS DESIGNED FOR*

In some cases generally due to adverse weather conditions, manure storages may be in danger of overtopping. The preferred solution is to land apply the manure where environmental issues will not be a concern. Other spreading sites should be located either by:

- Renewing your nutrient management plan if you have one and if the application rates are not already at the maximum, or
- Transferring the nutrient to another storage with excess capacity, or
- Find a broker who can take it and complete a Broker Agreement
- Find an Intermediate Generator who will accept it
- Acquire more land through ownership or Manure/Biosolid Application Agreement
- Non-agricultural operators may consider other disposal methods such as landfill, composting, incineration or other processing methods.

11.4 *AGRICULTURAL OPERATION: UNANTICIPATED RELEASE OF NUTRIENTS FOR EXAMPLE SPILLS, BREAK IN EQUIPMENT OR STORAGE*

This is an important contingency plan due to the direct environmental problems that can occur when a spill takes place. It must outline the required equipment, contacts and safety precautions.
The idea is to minimize the potential for a spill and if one does occur to ensure that the operator of the operations and the employees know what actions to take.

To Avoid A Spill
Calibrate your nutrient application equipment each year so that you have an estimate of what rate you are applying and how to adjust that rate to meet the recommendations set out in this plan.
Avoid spreading closer than 30 feet to a surface water source. Increase this distance if indicated by the P-index calculation.
Mark all tile outlets and catch basins for nutrient application and or inspection purposes.
Monitor all tile outlets for at least 24 hours during and after applications and supervise all operations for possible quick shutdown. Carry phones in your tractors and have someone assigned to do odd

jobs around the pump at the storage tank on spreading days so that they may be called for quick shut off of the pump.
Till the soil prior to application to break it up and to increase soil absorption when necessary.
Do not spread on the steep part of the field by surface water sources and avoid winter spreading on frozen ground or before rain events.

To Clean Up A Spill
Immediately stop the cause of the spill if possible:
Shut down the appropriate pumps and valves
Make sure the system cannot be restarted

Then contact the 24 hour Spills Action Centre at 1-800-268-6060 or your local Ontario Ministry of Environment office.

To Contain the Spill
If the spill gets into a tile drain, plug the tile at its outlet and pump the liquids from the tile to a field.
If the spill is moving over the ground surface, an earthen berm would be built with farm or commercial equipment such as backhoes or dump trucks.
Notify downstream users.

To Clean Up the Spill
Spread the nutrient according to your nutrient management plan or put it in an adequate nutrient storage for later application.

The following contacts are to be posted by all phones for immediate access in case of a spill:

- Spills Action Centre
- Local Ontario Ministry of Environment
- Bulldozer/Backhoe Operator
- Municipality
- Neighbours

Drainage Tile Monitoring
For application of nutrients to land that is tile drained, monitoring of that tile drain is required. In the event that contamination of the flow in the tile drain is found during monitoring there should be a plan for isolating that tile flow.

11.5 *WEATHER OR EQUIPMENT CONDITIONS IMPEDE PLANNED STORAGE OR APPLICATION*

Timing Change
When the timing of the manure application must be changed, adjust nutrient amounts to reflect the change in timing. Do not exceed the maximum annual nutrient application rate or the maximum volumetric rate per application.

Record the change in your nutrient management plan and adjust subsequent applications of nutrients to account for the change in timing of the nutrient application.

Crop Change
Nutrient amounts and formulation (where possible) should be adjusted to account for the change in crop. If the nutrients are already applied, the amount and formulation (where possible) is adjusted for the next crop and to account for the previous crop change.

Commercial Fertilizer Blend Change
Where the nutrient composition that is listed in the nutrient management plan is altered, then the altered formulation must meet the NMAN nutrient requirements. Subsequent nutrient applications must reflect the changes to the original nutrient management plan.

12 Part 12 - Brokers

A broker is a person who transfers nutrients (liquid or solid) from a generator to a receiver.

A broker must complete the Broker Agreement Form with each generator they take nutrients from and every receiver they take nutrients to. This form is found in part 16 of this Protocol. A copy of Broker Agreement must be held by each of the two parties involved in the transfer (i.e. Broker and Generator or Broker and Receiver).

13 Part 13 - Haulers

A hauler is a person who transfers non-agricultural nutrient materials (liquid or solid) from a generator to a receiver.

A hauler must acquire a system C of A to transport non-agricultural prescribed materials (biosolids), until such time that certification is required and obtained. They are responsible for providing to the generator, a list of land application sites and the corresponding NMP identifier numbers assigned by OMAF or the site C of A numbers. They must report annually all sites they delivered to and land applied non-agricultural materials and associated volumes. This annual report must be kept until such time that OMAF or MOE staff requires it.

14 Part 14 - Nutrient Quality

14.1 *MINMUM BENEFICIAL QUALITY REQUIREMENT*

All non-agricultural source prescribed materials must meet one of the following three conditions for permission to be land applied.

Condition 1

The material must have a "Multiple Index of Enhanced Value (MIEV)" greater than or equal to 1

MIEV = (% dry matter/100) x (% organic matter, dry weight)/15 + (% CCE, dry weight/25) + (% N + % $P_2O_5^-$ + % K_2O^-, dry weight)/2

CCE = calcium carbonates equivalent, dry weight
N = total kjeldahl nitrogen

Condition 2

The prescribed material has been proven, by a qualified researcher or recognized research facility, to improve soil quality or productivity or plant quality or growth in a statistically significant way under actual or comparable Ontario environmental conditions.

Condition 3

A liquid material can be applied to growing crops and only during the normally dry period in the summer.

The Ministry can require generator of a non-agricultural source prescribed material to submit data to show that the prescribed material meets one of the three conditions stated in paragraph 14.1, prior to the application of the material.

14.2 *SODIUM*

The Ministry can require generators of all non-agricultural source prescribed materials to provide sodium concentration in the material and/ or in the soil, prior to the application of the material.

The application rate of the material shall not result in an exceedance of the maximum permissible sodium addition specified in the following table.

Soil Texture	Maximum permissible sodium addition (kg/ha/year)
Sands, sandy loams	200
Organic soils, loams, clay loams and clays	500

14.3 *PH*

Non-agricultural prescribed materials with pH less than 6.0 or pH greater than 8.5, cannot be surface applied to growing crops.

14.4 *BORON*

The Ministry can require generators of all non-agricultural prescribed materials to provide boron concentration in the material and/ or in the soil, prior to the application of the material.

The application rate of the material shall not result in an exceedance of the maximum permissible boron addition specified in the following table.

Crop	Maximum permissible boron addition
Boron intolerant crops	1 kg boron/ha/year if the hot water soluble boron concentration in the soil does not exceed 1.0 mg/kg of soil, d.w.
Boron tolerant crops	2 kg boron/ha/year if the hot water soluble boron concentration in the soil does not exceed 1.5 mg/kg of soil, d.w.

14.5 *FATS, OILS, AND GREASES*

The Ministry can require all non-agricultural source prescribed materials to provide fats, oils and greases concentrations in the material, prior to the application of the material.

The application rate of the material shall not result in an excess of the maximum permissible fats, oils and greases addition specified in the following table.

Soil	Maximum permissible addition of fats, oils and greases
Clay and clay loam	2500 kg/ha/year
Sand, loam and sandy loam	5000 kg/ha/year

14.6 *NON-BIODEGRADABLE OBJECTS*

The Ministry can require generators of all non-agricultural source prescribed materials to provide concentration of foreign non-biodegradable objects such as but not limited to glass, metals, plastics, prior to application of the material.

The foreign non-biodegradable objects that do not pass through an 8 mesh screen size Tyler sieve (2.36 mm size openings) shall meet the following conditions :

The concentration measured in "% dry weight" of plastic objects shall not exceed 0.5% of the total sample; and

The concentration measured in "% dry weight" of foreign non-biodegradable objects other than plastics shall not exceed 2% of the total sample.

14.7 *OTHER PARAMETERS*

The Ministry can require generators of all non-agricultural source prescribed materials to provide data for other parameters and meet additional site management practices, concentration and /or loading standards.

14.8 *TREATMENT PROCESSES FOR NON-AGRICULTURAL MATERIAL PRESCRIBED UNDER PARAGRAPH 1.7 (1) 3*

Treatment process options

Option 1: Anaerobic Digestion Designed and operated in accordance with the conditions set out in Section 16.2 "Anaerobic Digestion" of the Ontario Ministry of Environment publication entitled "Guidelines for the Design of Sewage Treatment Works, July 1984", as amended from time to time. Follow the requirements for Option 6 if the anaerobic digestion process does not meet the conditions set out in Section 16.2 "Anaerobic Digestion" of the Ontario Ministry of Environment publication entitled "Guidelines for the Design of Sewage Treatment Works, July 1984", as amended from time to time.
Option 2: Aerobic Digestion Designed and operated in accordance with the conditions set out in Section 16.3 "Aerobic Digestion" of the Ontario Ministry of Environment publication entitled "Guidelines for the Design of Sewage Treatment Works, July 1984", as amended from time to time. Follow the requirements for Option 6 if the aerobic digestion process does not meet the conditions set out in Section 16.3 "Aerobic Digestion" of the Ontario Ministry of Environment publication entitled "Guidelines for the Design of Sewage Treatment Works, July 1984", as amended from time to time.
Option 3: Long Term Storage Material[1] which had been stored for more than 3 months after the storage facility had received the last batch of material for treatment. Sediments withdrawn from waste stabilization ponds which were designed and operated in accordance with the conditions set out in Section 19 of the Ontario Ministry of Environment publication entitled "Guidelines for the Design of Sewage Treatment Works, July 1984", as amended from time to time, and the waste stabilization pond has not received fresh raw sewage for 3 months or longer. Follow Option 6, if the above stated conditions cannot be met.
Option 4: Composting Material which has been treated by in-vessel, or static aerated pile or windrow composting method and the temperature of the material is raised to 40°C or higher and the material is maintained at this temperature for 5 days or longer, and for at least 4 hours during the 5-day period, the temperature in the compost pile exceeds 55 °C. Follow Option 6, if the composting facility does not meet the above stated conditions.
Option 5: Lime Stabilization Sufficient lime was added to the material to raise the pH of the material to 12 after 2 hours of contact. Follow Option 6 if the lime stabilization process does not meet the above stated conditions.
Option 6: Air Drying Materials are dried on sand beds or paved or unpaved basins for a minimum of 3 months. During 2 of the 3 months, the ambient average daily temperature is above 0°C.
Option 7: Other processes To be approved by the Ministry under the Ontario Water Resources Act or Environmental Protection Act, on a case-by-case basis. The approval may increase the frequency set out in Section 9.20 of the regulation for "Sampling, Analysis and Quality Standards for Land-Applied Materials".

[1] For the purpose of this Table, material means non-agricultural source material prescribed under Paragraph 1.7(1)3

14.9 *ODOUR STANDARDS FOR ALL PRESCRIBED MATERIALS*

All prescribed materials are classified into one of 3 odour categories O1 (Low Odour), O2 (Moderate Odour) and O3 (High Odour) as per the following Odour Category Table.

Odour Category Table

Odour Category	Prescribed Materials
O1 (Low Odour) Materials that have an odour which is less intensive than solid dairy cattle manure.	Agricultural lime
	Bark
	Cement kiln dust
	Chemical fertilizers
	Leaves
	Lime mud
	Magnesium residuals
	Matured fertilizing residuals compost
	Matured manure compost
	Paper biosolids with Carbon/Nitrogen >= 70
	Wood ash
	Wood chips
O2 (Moderate Odour) Materials that have an odour that is similar to solid dairy cattle manure	Acid treated paper biosolids
	Beef cattle manure
	Broiler manure
	Solid Dairy Cattle manure
	Immature manure compost

O3 (High Odour) Materials that is more intense than cattle manure but equal to or less than liquid hog manure	Abattoir waste and wastewater
	Grass clippings
	Liquid, beef cattle manure
	Liquid, dairy cattle manure
	Liquid, laying hen manure
	Liquid, milk calf manure
	Liquid, hog manure
	Milkhouse wastewater
	Milk wastes
	Sewage biosolids
	Non-acid treated paper biosolids with Carbon/Nitrogen ratio <70
	Paper biosolids that have been stored for more than 30 days before application
	Potato wastes
	Whey

The Ministry can add prescribed materials to or change the odour category of a prescribed material listed in the above Odour Category Table, from time to time.

The Ministry can change the odour category of a prescribed material based on actual data provided by the generator.

The Ministry can change the odour category of a prescribed material based on actual data provided by the public or obtained by the Ministry.

The Ministry can assign the odour category of a prescribed material if the material is not listed in the above Odour Category Table.

Generators of all prescribed materials must follow site management practices set out in the Table entitled "Incorporation Requirements Based on Odour Criteria in Part 9 of this protocol.

14.10 *BLENDING OF NON-AGRICULTURAL SOURCE PRESCRIBED MATERIALS*

The Ministry can allow generators to blend non-agricultural source prescribed materials prior to land application.

Both individual non-agricultural source prescribed materials to be blended and the blended mixture must meet the metals standards specified in the nutrient quality regulation.

The blended mixture must meet the applicable requirements specified in this protocol.

The blended mixture will be assigned an odour category based on the highest odour category of its individual material.

The Ministry can change the odour category of a blended material based on actual data provided by the generator.

15 Part 15 - Sampling and Analysis Protocol

15.1 *SAMPLING*

Methods for sampling soil or nutrient containing materials are published in the *Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land*, and in the OMAF crop recommendation publications. Updated descriptions of the methods will be included in an OMAF/MOE Sampling and Analysis Document (under development), as amended from time to time.

15.2 *ANALYSIS*

Analysis for available nutrients in Soil shall be carried out by an OMAF accredited soil test lab, and using methods approved by the Ontario Soil Management Research and Services Committee

Analysis for available nutrients in Nutrient solutions and Growing Media shall be carried out by an OMAF accredited soil test lab, and using methods approved by the Ontario Soil Management Research and Services Committee

Analysis for nutrients in Prescribed Materials shall be carried out using methods consistent with analytical methods identified as being suitable by OMAF and MOE. These are currently listed in the *Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land.* Updated information will be published in an OMAF/MOE Sampling and Analysis Document (under development), as amended from time to time.

Analysis for Other Criteria, as identified in the regulations, shall be carried out using methods consistent with analytical methods identified as being suitable by OMAF and MOE, and currently listed in the *Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land.* Updated information will be published in an OMAF/MOE Sampling and Analysis Document (under development), as amended from time to time.

16 Part 16 - Record Keeping

16.1 *ACTIVITY LOG REQUIREMENT*

The activity log will be used to keep a record of actual events and details. They must be made available for inspection purposes and therefore have to be kept on the farm unit or in a nearby place that is accessible by the farm unit operator 24 hours a day. A director may order that records must be held indefinitely.

The Activity Log is an effective tool to demonstrate the implementation of the nutrient management strategy or plan. Keeping adequate records also provides valuable benchmark information for the farm unit to indicate when a significant change has occurred that may require renewal of the nutrient management strategy or plan.

16.2 *CONTENTS OF AN ACTIVITY LOG*

The **actual:**

Cropping Practices
Crop type and planting date
1. Tillage method and date
2. Weather conditions around application and incorporation dates
3. Date and times of tile outlet monitoring including observations(on application dates)
4. Commercial fertilizer bills
5. Incorporation method and date
6. Harvest date
7. Yield

Application Practices:
1. For winter spreading: date, time, location, quantity, setbacks and reason for winter spreading
2. Nutrients types applied and application dates, rates, and methods
3. Nutrient quantities in storage

Livestock Information:
1. Livestock purchases
2. Livestock sales
3. Feed records

Other Required Information:
1. Documentation of any other time/conditions when a contingency plan is utilized. Including location, estimated volumes and remediation measures
2. What was done to resolve any written complaints

3. A copy of all inspection related recommendations and implementation of them.
4. Imported nutrient containing materials, date, tons or volume, description of the material (ie. agreements)
5. Biosecurity protocols for the operation

17 Part 17 - Forms

17.1 *FARM UNIT DECLARATION FORM*

A Farm Unit as defined by the Regulations of the Nutrient Management Act is the basis for a Nutrient Management Strategy and/or Nutrient Management Plan. All parts of the Nutrient Management Strategy or Plan are with respect to the landbase and any agricultural facilities declared in that Farm Unit and not to any other landbase or agricultural facilities. An Operator of an agricultural operation may declare more than one farm unit within that operation, provided each separate Farm Unit fits the definition. There is no minimum land ownership requirement for the land included in the farm unit. Manure/Biosolid Application Agreements are required for property that is included in the Farm Unit but not owned. There is no maximum number of Nutrient Units per Farm Unit.

A: Contact Information

Operation Identifier:
Category of Operation:
Farm Unit Operator:
Mailing Address:
Telephone and Email Address:

B: Location of all the Generating and Storage Facilities that are Part of this farm unit

Type of facility	Lot	Concession	Township	County

C: Location and Identification of Land that is Part of this Farm Unit.

Give each farm or field a unique name that will also be used the nutrient management plan for this farm unit.

Farm or Field Name	**Lot, Concession**	**Township, County**	**Former Township**
Roll Number	**911 Location (if applicable)**	**Property Identification Number**	**Tillable Acreage**

☐ Not owned, agreement attached

Farm or Field Name	**Lot, Concession**	**Township, County**	**Former Township**
Roll Number	**911 location (if applicable)**	**Property Identification Number**	**Tillable Acreage**

☐ Not owned, agreement attached

Farm or Field Name	**Lot, Concession**	**Township, County**	**Former Township**
Roll Number	**911 Location(if applicable)**	**Property Identification Number**	**Tillable Acreage**

☐Not owned, agreement attached

☐More facilities listed on the back of this form. ☐More land listed on the back of this form.

D. Declaration:

In accordance with this information, I, _____ (farm unit operator) declare that all facilities and property listed on this form comprise the entirety of this Farm Unit. I acknowledge that I am required to complete a nutrient management plan and/or Strategy, and that such nutrient management strategy and/or plan shall include all of the lands identified on this form.

I hereby warrant that the information contained on this form is true, and that **I have legal signing authority** to complete this document, as if taken under oath.

Indicate whether the operation that this farm unit is in, is either

☐Corporation Name:
☐Division of a Corporation, Name:
☐Partnership, Name Partners:
☐Sole Proprietorship, Name of business:

Farm Unit Operator (print)	Signature	Date
Witness (print)	Signature	Date

Note: The information in this form can be created using the NMAN software, so for software users the paper version of this form does not have to be used.

17.2 *STRATEGY DESCRIPTION FORM*

Note to users of this form: This form does not represent the entirety of a nutrient management strategy. It is meant to be used to gather the information contained in the common elements of a nutrient management strategy whether the user of the form is an agricultural operation or non-agricultural operation. Please refer to the Nutrient Management Protocol for a description of a complete nutrient management strategy for your operation type.

☐New nutrient management strategy, or ☐Renewal of nutrient management strategy

Operation Identifier:
Operator:
Mailing Address:
Telephone and Email:

A. Description of the Operation

Note: The information in this form can be created using the NMAN software, so for software users the paper version of this form does not have to be used.

17.3 *NUTRIENT MANAGEMENT STRATEGY OR PLAN CERTIFICATION FORM*

A. Certificate Reference

Name of Operator:

Address and Telephone:

Operation Identifier:

Nutrient Management Strategy and or Plan Number:

B. Certificate Signed by the Person who Prepared the Nutrient Management Plan or Strategy

I _____, hereby certify that based on relevant information provided in good faith and excluding unforeseen or uncontrollable circumstances, the recommendations contained in the attached report are compliant with the Nutrient Management Act.

Name (print)	Signature:	Date:

C. Certificate Signed by Farm Unit Operator

The farm unit operator who is developing this nutrient management plan and/or strategy and who has authorized a consultant in agriculture to review their nutrient management strategy or plan shall append the following statement to the report.

I _____, hereby certify that I have reviewed my nutrient management strategy and /or plan and I shall, in good faith, follow and implement the recommendations as set out within it.

Name (print)	Signature:	Date:

D. Certificate signed by Reviewer from Ontario Ministry of Agriculture and Food

I,_____, have reviewed the nutrient management plan or strategy and confirm that it meets the nutrient management review criteria of the Ontario Ministry of Agriculture and Food.

Name (print)	Signature:	Date:

Note: The information in this form can be created using the NMAN software, so for software users the paper version of this form does not have to be used.

17.4 *MANURE OR BIOSOLID APPLICATION AGREEMENT*

Land Owner Name:

Address and Telephone:

Farm Unit Operator Name:
Operation Identifier: **Nutrient Management Plan Number:**

This agreement, between the above parties, allows for the following fields to be included in the farm unit operator's Declaration and for application of manure or biosolids to these fields under the farm unit's nutrient management plan.

List each field/section under this agreement:

Lot	Concession	Township	County	Tillable Acres	Roll Number

☐ There are more fields listed on the back of this form.

I, _____(landowner) give permission to _____(farm unit operator) to incorporate the above lands into Nutrient Management Plan #_____.
I also give permission to them to do soil sampling on the properties listed to determine the condition of the soil. I also agree that the land identified in this agreement will not be used for the application of any other prescribed material, originating from any other operation, including my own (if I have any) during the term of this agreement. This agreement shall be in force for a minimum period of one (1) year, commencing on _____and ending on _____. Pollution liability insurance will be carried by _____(farm unit operator) to cover spill cleanup and liability.

Land Owner Name (please print)	Signature	Date
Farm Unit Operator Name (please print)	Signature	Date
Witness Name (please print)	Signature	Date

Note: Permission to use these lands is required from all property owners listed on the title to the land. For properties owned by more than one person, permission may be given by additional owners in the form of a signature on this form or a signed letter accompanying this form.

17.5 *BROKER AGREEMENT*

Broker Name and Operation Identifier:

AND

Generator
Name: Operation Identifier: Strategy Number:

OR

Receiver
Name: Operation Identifier: Strategy or Plan Number:

This agreement, between the above listed parties, is for the transfer of the prescribed material identified as:

- ☐ Farm Animal Manure
- ☐ Washwaters from Ag Operations
- ☐ Pulp and Paper Sludge
- ☐ Leachate from on-Farm Feed Storage
- ☐ Runoff from Livestock Yards or Manure Storage
- ☐ Greenhouse and Nursery leachate
- ☐ By- Products of On-Farm Processing, includes fruit and vegetable matter
- ☐ Organic Materials Produced by Intermediate Handlers (ie Compost)
- ☐ Biosolids (ie municipal sewage, pulp and paper sludge)

The quantity being transferred is:

The Parties to this Agreement Hereto Agree as Follows:
This agreement shall be in force for a minimum period of one (1) year commencing _____ and ending _____.

The terms of this agreement shall strictly apply to the present Broker. Should the Broker use the nutrient in a manner, which is demonstrated to cause environmental harm, the agreement ceases to apply.

The nutrients included in this agreement will be managed under a nutrient management strategy or plan.

Generator or Receiver Name (please print)	Signature	Date
Broker Name (please print)	Signature	Date
Witness Name (please print)	Signature	Date

17.6 *PRESCRIBED MATERIAL TRANSFER AGREEMENT*

Generator
Name: Operation Identifier: Strategy Number:

AND

Receiver
Name: Operation Identifier: Strategy or Plan Number:

This agreement, between the above listed parties, is for the transfer of the prescribed material identified as:

- ☐ Farm Animal Manure
- ☐ Washwaters from Ag Operations
- ☐ Pulp and Paper Sludge
- ☐ Leachate from on-Farm Feed Storage
- ☐ Runoff from Livestock Yards or Manure Storage
- ☐ Greenhouse and Nursery leachate
- ☐ By- Products of On-Farm Processing, includes fruit and vegetable matter
- ☐ Organic Materials Produced by Intermediate Handlers (ie Compost)
- ☐ Biosolids (ie municipal sewage, pulp and paper sludge)

The quantity being transferred is:

The Parties to this Agreement Hereto Agree as Follows:

- The receiver will manage these nutrients in their nutrient management strategy or plan.
- The receiver if a farm unit will include the land that these materials are applied to in their farm unit and therefore on their Farm Unit Declaration.
- The Generator will include these prescribed materials in their nutrient management strategy.
- Both parties will include this agreement in their nutrient management strategy and/or plan.
- The Generator and the Receiver warrant that between them there is adequate storage these prescribed materials that meets the regulations for construction and siting.
- The terms of this agreement shall strictly apply to the present Receiver. Should the Receiver use the nutrient in a manner, which is demonstrated to cause environmental harm, the agreement ceases to apply.

This agreement shall be in force for a minimum period of one (1) year commencing _____ and ending _____.

Generator Name (please print)	Signature	Date
Receiver Name (please print)	Signature	Date
Witness Name (please print)	Signature	Date

17.7 *DRAFT CONTENT AND FORMAT OF NMS FOR NON AGRICULTURAL (MUNICIPALITY AND INDUSTRY) OPERATIONS GENERATING AND LAND APPLYING NUTRIENT MATERIALS*

If you are a nutrient generator of land applied nutrients, you must submit a nutrient management strategy to the Ministry of the Environment, Environmental Assessment and Approvals Branch, for review every five years. In addition you are responsible for a documented annual update that will be available on site.

Nutrient Management Strategy. Prepare and submit Part I through Part V.

Part I – Facility Description and Approval Information

Facility Name:	Date of Submission: day/month/year (Must be 90 days before required due date)
Facility Address (physical location): street number, street, city/town	Date of Approval: day/month/year
	Approving Director signature: day/month/year
Facility's Representative Name: (person responsible for this NMS)	Date of Expiry (5 Years from Submitted Date): day/month/year
Facility's Representative Sign-Off Signature:	Total Volume of materials produced at facility cu.m./day or dry tonnes/yr

Part II: Material Description and Storage Information

Type(s) of Material Produced (e.g. sewage biosolids, pulp and paper biosolids, waste water)	Description of Material (solid, liquid, mixed)	Average Annual Volume (Period of Plan)	Storage				
			On-Site X	Off-Site X	If Off-Site, list physical location of each storage facility	CofA No. - issue date & expiry date (da/mon/yr)	Storage capacity (Imp. Gal /tonnes/m^3)

Part III: Projected Five-Year Strategy for Materials Generated

	Volume (Imp. Gal/tonnes/m^3)				
	Year 1	Year 2	Year 3	Year 4	Year 5
Land Application					
Landfill Disposal					
Incineration					
Processed(composting, etc.)					
Other					
TOTAL					
If volumes have changed between years, describe why this has occurred:					

Part IV: Analysis of Materials

Provide a strategy for the analysis of materials that includes:
sampling of materials for metals and pathogens;
determining odour categories;
monitoring and analysis of results and record keeping; and
providing required data to haulers.

The sampling strategies must meet or exceed the standards established in the Regulations and Protocols.

Part V: Contingency Plan

A written contingency plan is required that outlines alternative actions in the event that the strategy cannot be followed:
Alternate Storage
Alternative Disposal

For spills, non-agricultural facilities are subject to regulation 347, Part IX, of the *Environmental Protection Act*.

Annual Strategy: Complete Part VI annually. Submit Year One with Nutrient Management Strategy. Prepare Year Two through Year Five annually and retain on site with Nutrient Management Strategy. Submit completed copies of Part VI for all five years, with the subsequent Nutrient Management Strategy.

Part VI: Destination of Materials - Land Application, Landfill, Incineration, Processed, Other.

Land Application (copy sheet if more than 1 hauler)			Year of Strategy:			
Name of Hauler Company: System CofA Number or Certification Number:						
	Site CofA # or NMP# & Site CofA Expiry Date (dd/mm/yy)	NMP # & NMP Expiry Date (dd/mm/yy)	Approved Area for Application (Acres)	Approved Application Rate (Imp. Gal./tonnes/m^3 per acre)	Total Volume to be applied (Imp. Gal./ tonnes/m^3)	Storage Capacity Volume (Imp.Gal./ tonnes/m^3)
Site 1						
Site 2						
Site 3						
Site 4						
Site 5						
Site 6						
Site 7						

Landfill Disposal	Year of Strategy:

Name of Landfill Site	Total Volume Disposed (Imp. Gal./tonnes/m^3)	Landfill Cover				
		daily cover X	interim cover X	final cover X	Receiving Site and CofA Number	Cover Volume (Imp. Gal /tonnes/m^3)

Incineration		Year of Strategy:	
Total Volume Disposed (Imp. Gal./tonnes/m^3)	On Site X	Off Site Location Address	CofA A Number (if applicable)

Processed Material (composting etc.)	Year of Strategy:				
Describe Type of Process (compost, other)	Total Volume Disposed (Imp. Gal./tonnes/m^3)	Location		CofA No. for receiving site (if applicable)	NMS No. for receiving site (if applicable)
		on site X	offsite address		

Other Disposal Methods (reported annually)		Year of Strategy:			
Describe Method	Total Volume Disposed (Imp. Gal./tonnes/m^3)	Location		CofA No. for receiving site (if applicable)	NMS No. for receiving site (if applicable)
		on site X	offsite address		

75

Other Disposal Methods (reported annually)		Year of Strategy:			
Describe Method	Total Volume Disposed (Imp. Gal./tonnes/m^3)	Location		CofA No. for receiving site (if applicable)	NMS No. for receiving site (if applicable)
		on site X	offsite address		

Annual Report: Complete Part VII and Part VIII within 60 days of each year end and retain on site with Nutrient Management Strategy. Submit completed copies of Parts VII and VIII for all five years, with the subsequent Nutrient Management Strategy.

Part VII: Report on Management of Materials - Land Application, Landfill, Incineration, Processed, Other.

Land Application Report (copy sheet if more than 1 hauler) (annual)			Year end for Strategy Year:			
Name of Hauler Company: System CofA Number or Certification Number:						
	Site CofA # or NMP# & Site CofA Expiry Date (dd/mm/yy)	NMP # & NMP Expiry Date (dd/mm/yy)	Approved Area for Application (Acres)	Approved Application Rate (Imp. Gal./tonnes/m^3 per acre)	Total Volume applied (Imp. Gal./ tonnes/m^3)	Stored Volume (Imp.Gal./ tonnes/m^3)
Site 1						
Site 2						
Site 3						
Site 4						
Site 5						
Site 6						
Site 7						

Landfill Disposal Report (annual)	Year end for Strategy Year:					
Name of Landfill Site	Total Volume Disposed (Imp. Gal./tonnes/m^3)	Landfill Cover				
		daily cover X	interim cover X	final cover X	Receiving Site and CofA Number	Cover Volume (Imp. Gal /tonnes/m^3)

Incineration Report (annual)		Year end for Strategy Year:	
Total Volume Disposed (Imp. Gal./tonnes/m^3)	On Site X	Off Site Location Address	CofA A Number (if applicable)

Processed Material Report(composting etc.)	Year end for Strategy Year:				
Describe Type of Process (compost, other) (annual)	Total Volume Disposed (Imp. Gal./tonnes/m^3)	Location		CofA No. for receiving site (if applicable)	NMS No. for receiving site (if applicable)
		on site X	offsite address		

Other Disposal Methods Report (annual)		Year end for Strategy Year:			
Describe Method	Total Volume Disposed (Imp. Gal./tonnes/m^3)	Location		CofA No. for receiving site (if applicable)	NMS No. for receiving site (if applicable)
		on site X	offsite address		

Part VIII: Report on Five-Year Strategy for Nutrient Materials Generated

	Total Volume (Imp. Gal/tonnes/m^3)

	Year 1	Year 2	Year 3	Year 4	Year 5
Land Application					
Landfill Disposal					
Incineration					
Processed(composting, etc.)					
Other					
TOTAL					
If volumes have changed between years, describe why this has occurred:					

18 Part 18 – Appendix

18.1 *OMAF NMAN COMPUTER PROGRAM*

18.2 *OMAF NUTRIENT MANAGEMENT WORKBOOK*

Nutrient Management Worksheet (For 'Cash Crops' Ignore Manure sections)

A	Field Information No.____ Field ID _____ Field Size_____ ac Crop Type _____ Yield _____ Previous Crop _____ Soil Texture_____ Soil Hydrologic Group____ Soil Test: Sodium Bicarbonate P____mg/l Ammonium Acetate K ____mg/l

B	Manure* Information Description _____ Application Rate (F)_____ Time of Application: • L Summer • E Fall • L Fall • Spring PP • Spring SD • Summer Incorporation: Incorporated: • 1 day • 3 days • 5 days • Not Incorporated • Injected Nutrient Values: lb/1000 gal lb/1000 gal lb/1000 gal N: _____ lb/ton P_2O_5 _____lb/ton K_2O:_____lb/ton Nutrients from Manure are calculated as Nutrient Value multiplied by Application Rate.

	Agronomic Nutrient Balance	N	(lbs/acre) P_2O_5	K_2O
C	Fertilizer	+_____	+_____	+_____
D	Previous Crop	+_____		
E	Previous Manure	+_____		
G	This Year's Manure	+_____	+_____	+_____
H	Production Requirements	- _____	-_____	-_____
I	Agronomic Nutrient Balance	_____	_____	_____

	Crop Removal Balance	N	(lbs/acre) P_2O_5	K_2O
J	Field Inputs (Line C+D+E)	+ _____	+_____	+_____
K	This Year's Manure	+ _____	+_____	+_____
L	Crop Removal	- _____	- _____	- _____
M	Crop Removal Balance	_____	_____	_____
N	N Available for Potential Loss	_____		

O	Nitrogen Index: N-Index Value = Value A _____ + Value B _____ = _____ Maximum N-Index Value = _____ (Determine from chart in Section O)
P	Phosphorus Index: a)____ +b)____ + c)____ +d)____ + e)____ = _____
Q	Minimum Separation Distance from Surface Water _____
	Minimum Separation Distance from Wells and Bedrock Issues to be added
R	Useable Acreage _____

*In this workbook, "Manure" includes any nutrient source other than commercial fertilizer

B. Manure Information

Enter the description, time of application, and incorporation details for the manure applied to this field.

Method #1 – Using Information from Manure Analysis Report

Calculate the **available** N, P_2O_5, & K_2O. Some labs may have already done these calculations. Obtain factors 1 & 2 from the charts. The calculations provided here are only valid for spring, pre-plant or in crop applications of manure.

The following conversions may be required:

- to convert % to lb/1000gal multiply by 100
- to convert % to lb/ton multiply by 20
- to convert ppm to % divide by 10000

⚠ Attach manure test results.

Available N

(%N - %NH_4N) X Factor 1+ (%NH_4N X Factor 2)

(_____ - _____) X _____ + (_____ X _____) = _____% = _____ lb/1000gal / lb/ton

Available P_2O_5

%P _____ X 0.92 = _____% = _____ lb/1000gal / lb/ton

Available K_2O

%K _____ X 1.08 = _____% = _____ lb/1000gal / lb/ton

Factor 1: Available Organic N

Liquid		Liquid & Solid	Solid		
Poultry	All Other	Biosolids	Poultry	<50% dry matter	>50% dry matter
0.3	0.2	0.3	0.3	0.1	0.05

Factor 2: Ammonium Retention

Incorporation Details	Injected	Incorporated			Not Incorporated	
		1 day	3 days	5 days	Bare Soil	Residue
Retention Factor	1.00	0.75	0.65	0.55	0.34	0.50

Example:

A farmer has liquid swine manure of 0.3% N, 0.1% P, 0.2% K, and 1000 ppm NH_4N (0.1%). He plans to incorporate the manure within 3 days.

N: (0.3 – 0.1) X 0.2 + 0.1 X 0.65 = 0.105% = 10.5 lb/1000gal

P_2O_5: 0.1 X 0.92 = 0.092% = 9.2 lb/1000gal

K_2O: 0.2 X 1.08 = 0.216% = 21.6 lb/1000gal

Method 2: Using Typical Analysis (Data Bank), or Lab Analysis for Fall Applied Manure

Using Data Bank Information

Where a manure analysis is not available, use the numbers in the typical analysis chart below and the formulas to determine average N, P_2O_5 and K_20 values.

% to lb/1000gal multiply by 100
to convert % to lbs/ton multiply by 20

Available N

%Total N X Factor 1=_____X _____=_____% = _____ lb/1000gal / lb/ton

Available P_2O_5

%P _____ X 0.92 = _____% = _____ lb/1000gal / lb/ton

Available K_2O

%K _____ X 1.08 = _____% = _____ lb/1000gal / lb/ton

Factor 1: Available Nitrogen (as a Proportion of Total Nitrogen**)

Application Time	**Incorporated** (<24 hours)					**Not Incorporated**				
	Late Summer	Early Fall	Late Fall	Pre-Plant	Side-dress	Early Fall	Late Fall	Pre-plant Bare Soil	Pre-plant Residue	Side-dress
Urea (commercial N)	.1	.2	.5	1	1	.1	.4	.85	.75	.85
Solid Cattle/Sheep	.3	.3	.3	.4	--	.25	.2	.2	.2	.2
Solid Poultry	.3	.4	.5	.6	--	.3	.3	.3	.3	.3
Liquid Cattle	.3	.4	.5	.6	.7	.3	.4	.5	.55	.6
Liquid Swine	.2	.3	.4	.7	.8	.2	.3	.4	.45	.5
Liquid Biosolids	.3	.4	.5	.6	.7	.3	.4	.5	.55	.6

Source: Adapted from Barry, Beauchamp et al U of Guelph 2000
* Available N = Total Manure N applied x Factor 1 (assumes a spring planted crop)
**accounts for ammonia loss to atmosphere and mineralization of organic N
For manure incorporated within 3 days Use: (incorporated value + non-incorporated value)/2

NMAN uses a more detailed method of determining available N. For different incorporation periods, NMAN will provide more precise estimates of available N.

Where a cover crop is utilized and manure is applied in late summer or fall, use the late fall column to determine the Available Nitrogen for the next crop.

⚠Where manure is applied following the harvest of a crop (late summer or fall), Section O (Nitrogen Index) must be completed.

Typical Analysis Chart

Type of Manure	% Dry Matter	% Total Nitrogen	% Organic Nitrogen	% P	% K
Liquid					
Beef**	6	.28	.13	.08	.18
Dairy – outside storage*	6	.30	.14	.07	.23
Dairy –under barn storage*	8	.41	.20	.09	.29
Dairy heifers	11	.55	.30	.13	.32
Poultry layers	10	.74	.22	.26	.30
Swine- sows/weaners	3	.35	.11	.10	.15
Swine – finishers	5	.49	.19	.16	.20
Swine finishers -wet/dry feeders	6.5	.58	.23	.20	.24
Liquid Runoff	1.0	.10	.04	.02	.12
Liquid Biosolids - anaerobic	4.4	.28	.19	.14	0
Milk-fed Veal	1.5	.08	.24	.02	.18
Solid					
Beef	25	.72	.64	.25	.59
Dairy	20	.55	.42	.16	.47
Poultry – layers	20	1.15	.51	.51	.43
Poultry – broilers	> 50	2.73	2.3	1.3	1.45
Sheep	30	1.06	.61	.59	.70
Horses	50	.32	.28	.26	.61

Source: NMAN Data Bank. 2001
* assumes milkhouse wastes
**assumes some yard runoff

Example:
A farmer has liquid hog manure from a finishing barn. He does not have wet/dry feeders. He will apply the manure in late April and plans to incorporate his manure within 24 hours. Since a manure test is not available he uses the above chart and the calculations to find available N, P_2O_5 and K_2O. He finds his manure to have the following nutrients available the first growing season:

N: .49% X .7 (factor 1) X 100 = **34.3** lb/1000gal
P_2O_5: .16% X .92 X 100 = **14.7** lb/1000gal
K_2O: .22% X 1.08 X 100 = **23.8** lb/1000gal

D. Previous Crop Nitrogen Input

Use the following chart to determine the reduction in nitrogen requirement for this year's crop.

Crop	N (lb/ac)
Established Forage - under 1/3 legumes	0
Established Forage - 1/3 to 1/2 legumes	50
Established Forage - over 1/2 legumes	100
Perennial Legumes plowed in Seeding Year	40
Corn following Soybeans (< 2800 chu)	30
Corn following Soybeans (> 2800 chu)	15
Corn following Silage Corn (< 2800 chu)	10
Corn following Cereals - straw removed (< 2800 chu)	10
Non legume fall cover crop (with applied manure)	20
Other crops	0

Source: OMAFRA Publication 296 – Field Crop Recommendations

Example:

A field that receives 2900 heat units was planted to soybeans last year. From the above chart, the N reduction for this year's crop is 15 lb/ac.

E. Previous Manure Nitrogen Input

If a representative manure test is available, use the following formula to determine the organic N content of the manure. (To convert: % to lb/1000gal multiply by 100, % to lb/ton multiply by 20.)

Organic N = %N - $\%NH_4N$

_____ - _____ = _____ **% Organic N =** _____ lb/1000gal / lb/ton

If a manure test is not available, use the % Organic N in the manure analysis chart in section B.

Organic N is available in the following percentages:
10 % for manure applied **last year**
5 % for manure applied **two years ago**
2 % for manure applied **three years ago**

Calculate the amount of nitrogen available to this years crop. Then add the result for each of the past 3 years.

$$\text{N Available} = \text{Application Rate} \times \text{Organic N} \times \%\ \text{Available}$$

Example Calculation:
Last year liquid swine manure was applied to this field at 5000 gal/ac and three years ago at 7000 gal/ac. The manure has an organic N content of 0.19% (0.0190 lb/gal or 19.0 lb/1000gal).

N Available = (5000 gal/ac)().0190 lb/gal)(10%) + (7000 gal/ac)(0.0190 lb/gal)(2%)
= 9.5 + 2.5 = 12 lb/ac

F. Liquid Manure Application Rate

Estimate a manure application rate. For liquid manure, make sure that the rate does not exceed the maximum allowable application rate specified in the charts below. You may consider several separate applications to allow higher rates (provided nutrient levels are acceptable). For solid manure, it is not necessary to evaluate the maximum application rate for runoff concerns.

Maximum Application Rate

Runoff Potential	Surface Applied	Incorporated or Pretilled
High	4450 gal/ac	6700 gal/ac
Moderate	6700 gal/ac	8900 gal/ac
Low	8900 gal/ac	11600 gal/ac
Very Low	11600 gal/ac	13400 gal/ac

STOP The application rate must not exceed the above numbers.

Runoff Potential

Soil Hydrologic Group	Maximum Sustained Field Slope			
	< 3 %	3 - 6 %	6 - 9 %	9-12 %
A (Rapid)	Very Low	Very Low	Low	High
B (Moderate)	Very Low	Low	Moderate	High
C (Slow)	Low	Moderate	High	No Application
D (Very Slow)	Moderate	High	High	No Application

Use the runoff potential to determine the maximum allowable application rate. Soil Hydrologic Group is found in Table 3.

Example

After several tries an application rate of 3000 gal/ac was selected. For the clay loam soil (Group C, or "Slow") on a 4% slope this rate is less than the maximum of 6700 gal/ac.

H. Ontario Crop Production Requirements

Using soil test results, obtain production requirements from OMAFRA Publication 811, 360, 610, 383, 384, 298, or 363. Recommendations for some common crops are displayed in the tables below.

N Recommendations

Corn:

Location	N Recommendations (lb/ac)				
Expected Yield (bu/ac):	*100*	*130*	*150*	*160*	*175*
Eastern Ontario	85	120	150	160	180
Western / Central Ontario (<2700 chu)	95	110	120	120	125
Midwestern Ontario (2700-2900 chu)	125	140	150	150	160
Southwestern Ontario (>2900 chu)	150	165	175	180	190

For side dress applications in SW Ontario reduce N recommendations by 15%

Winter Wheat and Canola:

	N Recommendations (lb/ac)			
Expected Yield (bu/ac):	*35*	*60*	*70*	*80*
Winter Wheat (soft white/red)	---	75	85	100
Winter Wheat (hard red)	---	110	120	135
Spring Canola (< 2300 chu)	120	120	120	---
Spring Canola (> 2300 chu)	90	90	90	---
Winter Canola (at planting) - spring	(35) - 145	(35) - 180	(35) - 190	---

Source: OMAFRA Publication 811 Agronomic Guide for Field Crops

Soybeans, Alfalfa: N Recommendations = 0 (with proper inoculation)

Example: A field located in eastern Ontario has a P soil test of 35 ppm and K soil test of 79 ppm. The field is to be planted to corn and is expected to yield 135 bu/ac. The N requirement is obtained

from the top chart by estimating the yield between 130 bu/ac and 150 obu/ac. The N recommendation is approximately 128 lb/ac.

I. Agronomic Nutrient Balance

N: N Balance = Line C + Line D + Line E + Line G - Line H

P_2O_5: P_2O_5 Balance = Line C + Line G - Line H

K_2O: K_2O Balance = Line B + Line G - Line H

Calculate the agronomic nutrient balance for N, P_2O_5, and K_2O. For soybeans and legume forages (or any crop with a zero nitrogen recommendation), calculate the crop removal for nitrogen.

Discussion of Limits

A Positive numbers indicate over application of nutrients (surplus) while negative numbers indicate under application (potential deficiency) of nutrients for this crop.

⚠ If the N agronomic balance (Line I) exceeds 15 lb/ac, complete Section J "Crop Removal Balance" and Section O "Nitrogen Index".

⚠ If the N or P_2O_5 or K_2O balance is negative a reduction in crop yield may be observed. Consider adding commercial fertilizer or increasing the rate of manure application.

⚠ If the P_2O_5 or K_2O balance exceeds 15 lb/ac then significantly more nutrients are being applied to the field than are required by the crop. It may be more economical to apply the extra manure to another field.

⚠ If P_2O_5 balance exceeds 15 lb/ac, it is necessary to complete the 'Crop Removal Balance' for phosphorous (section J to M).

Crop Removal Balance (for legume crops or crops without N recommendations)

J. Field Inputs

N: N Inputs = Line C + Line D + Line E

P_2O_5: P_2O_5 Inputs = Line C

Calculate the field inputs for the Crop Removal Balance.

K. Manure Nutrients Applied

N Applied = Line G

P2O5: P_2O_5 Applied = Line G × 2

Calculate the manure nutrients applied for the crop removal balance.

Note: N applied in manure is the same as the agronomic balance. P2O5 nutrients are doubled to account for an 80% phosphorus available for soil buildup (only 40% is available to this years crop).

L. Crop Removal

Use the following chart and equation to determine the nutrient removal value(s) for this year's crop.

Crop	Base Yield	Removal Base Value(lb/ac)	
		N	P_2O_5
Corn	150 bu/ac	120	61
Corn Silage	18 ton/ac	206	92
Wheat (soft red/white)	75 bu/ac	90	44
Wheat (hard red)	75 bu/ac	105	44
Barley	75 bu/ac	74	29
Soybeans	50 bu/ac	194	42
Oats	75 bu/ac	54	19
Alfalfa	5 ton/ac	316	66
Canola	45 bu/ac	95	55

Source: Potash and Phosphorus Institute (PPI)

$$\text{Crop Removal} = (\text{Base Value})\left(\frac{\text{Estimated Yield}}{\text{Base Yield}}\right)$$

Example:
A crop of corn is expected to yield 135 bu/ac. What is the P_2O_5 crop removal value?

$$P_2O_5 \text{ Crop Removal} = (61 \text{ lb / ac})\left(\frac{135 \text{ bu / ac}}{150 \text{ bu / ac}}\right) = 55 \text{ lb / ac}$$

M. Crop Removal Balance

$$\text{Nutrient Balance} = \text{Line J} + \text{Line K} - \text{Line L}$$

Calculate the crop removal balance for the appropriate nutrient(s).

Discussion of Limits
A negative balance indicates that this year's crop is removing more nutrients from the soil than are being added through manure and field inputs. Soil test values may decrease for next year.

A positive balance indicates that manure and field input nutrients exceed those removed from the soil by this year's crop. Soil test values may increase for next year. Upper limits for the application of nutrients have been established and are outlined below.

N Limits
⚠ Complete Section O (Nitrogen Index)

STOP The total amount of N (Line J + Line K) applied to the field should not exceed +200 lb/ac in any single year, or the actual crop removal if it is greater than 200 lb/ac. Attach supporting documentation if this is the case.

P_2O_5 Limits

STOP The P_2O_5 balance must not exceed +70 lb/ac (Line M). If manure is applied once every two years this limit may be raised to +140 lb/ac. If manure is applied once every three years this limit may be raised to +210 lb/ac. Additional land base must be documented. Above these levels, the risk of surface water contamination may exist.

N. Nitrogen Available for Potential Loss

Determine "Factor 2" for N applied following crop harvest (see Table of "Factor 2 Values Below:)

Factor 2: Estimate of N Available for Loss (Leaching or Denitrification)*

Application Time	**Incorporated** (<24 hours)					Not Incorporated				
	Late Summer **	Early Fall**	Late Fall	Pre-Plant[1]	Side-dress[1]	Early Fall **	Late Fall	Pre-plant[1] Bare Soil	Pre-plant[1] Residue	Side-dress[1]
Urea (commercial N)	.8	.7	.5	0	0	.4	.5	0	0	0
Solid Cattle/Sheep	.15	.125	.1	.05	---	.1	.05	0	0	0
Unbedded Solid Poultry* **	.4	.3	.2	.1	---	.3	.2	.1	.05	0
Bedded Solid Poultry	.4	.3	.2	.1	---	.1	.05	0	0	0
Liquid Cattle	.4	.3	.2	.1	.05	.3	.2	.1	.05	0
Liquid Swine	.6	.5	.3	.1	.05	.3	.2	.15	.1	0
Liquid Biosolids	.4	.3	.2	.1	.05	.3	.2	.1	.05	0

* assumes a spring planted crop — Source: Adapted from Barry, Beauchamp et al., U of G 2000
** use late fall number where a fall cover-crop is being grown
***Unbedded solid poultry manure is usually from caged layers and has dry matter > 50%
For manure incorporated within 3 days Use: (incorporated value + non-incorporated value)/2

Calculate the Nitrate Leaching Risk Index (Section O).

N Available for Loss = Total N (lbs/gal)____ **X Application Rate**____ **X Factor 2**____= -
_____ . (lbs/ton)

(To convert lb/1000 gal to lb/gal divide by 1000)

O. Nitrogen Index

For all crops, use the Table below to calculate the N-Index.

Value A) Nitrogen in Excess of Crop Removal — Value B) Nitrogen Available for Loss

Crop Removal Balance* (Line M)	Value A	N Available for Loss (Line N)	Value B
< 15	0	< 15	0
15 – 30	1	15 – 25	1
31 – 45	2	26 – 35	2
46 – 60	3	36 – 45	3
61 – 80	4	46 – 60	4
81 - 120	5	61 - 80	5
> 120	STOP	> 80	STOP

Add the values from each section to get the total N-Index

N-Index Value = A _____ + B _____ = _____

Determine the Hydrologic Soil Group Category for the field from the soil types (soil series names) present in the field. Hydrologic soil Groups corresponding to the various soil series names found in Ontario are listed on the next page or in the Ontario Drainage Guide (publication 29)

Determine the Maximum Index Value for the Critical Hydrologic Soil Group for the field from the Table below:

N-Index Value related to Soil/Site Risk

Hydrological Soil Group	Leaching Risk	Maximum N-Index Value
AA	Very high	1
A	High	3
B	Medium	4
C	Low	6
D	Very Low	9

* Soils shallow to bedrock move up one risk level

STOP The N-Index Value must not exceed the maximum N-Index number determined from the above chart for the field of concern.

Table 3: ONTARIO SOIL SERIES AND HYDROLOGIC SOIL GROUP

SOIL SERIES	**HYDROLOGIC SOIL GROUP**	SOIL SERIES	**HYDRO LOGIC SOIL GROUP**	SOIL SERIES	**HYDROLOGIC SOIL GROUP**
Alberton	D	Christy	C	Grand	B
Allendale*	C	Clyde	D	Grenville*	B
Alliston*	B	Codrington	C	Grimsby*	A
Almonte	C	Colborne	A	Guelph*	B
Ameliasburg	D	Colwood*	C	Guerin*	B
Ancaster	B	Conestoga	B	Gwillimbury	B
Appleton	B	Conover	C	Haldimand	C
Atherley	D	Cooksville	B	Hampden	D
Ayr	C	Craigleith	C	Harkaway*	B
Bainsville	C	Cramahe	A	Harriston	B
Balderson	B	Crombie	C	Harrow	A
Bamford	B	Dalton	C	Havelock	A
Bancroft	A	Darlington	B	Hawkesville	C
Bass	D	Deloro*	B	Haysville	B
Battersea	C	Donald	B	Heidelberg	B
Bearbrook	D	Donnybrook	A	Hendrie	B
Belmeade	D	Dorking	D	Hespeler	C
Bennington	B	Dumfries*	A	Hillier	B
Berriedale	A	Dummer*	B	Hillsburgh	A
Berrien	C	Dundonald	B	Hinchinbrook e*	C
Beverly*	C	Dunedin	C	Honeywood	B
Binbrook	C	Eamer	B	Howland*	B
Blackwell	D	Earlton*	B	Huron	C
Bolingbroke	A	Eastport	A	Innisville	C
Bondhead*	B	Edenvale	C	Jeddo	D
Bookton	B	Eganville*	B	Kagawong	B
Boomer	B	Elderslie	C	Kars	A
Brady*	B	Eldorado	B	Kelvin	D
Brant*	B	Ellwood	C	Kemble*	C
Brantford	C	Elmbrook	C	Kenabeek	C
Bridgman	A	Elmira	C	Killean	B
Brighton	A	Elmsley	B	King	C
Brisbane*	B	Embro	C	Kirkland	A
Brockport	B	Emily*	B	Kossuth	B
Brooke	C	Englehart	C	L'Achigan	B
Brookston	D	Evanturel*	B	Lambton	C
Bucke	B	Farmington	B	Lanark	C
Burford*	A	Ferndale	D	Landsdowne*	D
Burnbrae	B	Flamboro*	C	Leech*	D
Burnstown*	B	Floradale	B	Leith	B

Burpee	C
Buzwah*	C
Caistor	C
Caledon	A
Camilla	B
Campbell*	C
Cane*	D
Carp*	C
Casey	B
Cashel	C
Castor*	C
Chesley	D
Chinguacousy*	C
SOIL SERIES	**HYDROLOGIC SOIL GROUP**
Macton	B
Magnetawan	C
Mallard*	B
Malton	D
Mannheim	B
Manotick	B
Maplewood	C
Marionville	C
Marsh	D
Maryhill	C
Matilda	B
Matson	C
Medonte	C
Miami	C
Mill	C
Milliken	B
Minesing	D
Mississauga	D
Monaghan	C
Monteagle*	B
Morley	D
Morrisburg	C
Moscow*	D
Mountain	C
Muck	D
Muriel	C
Murray	C
Napanee*	D
Nelson	C
Newburgh	B

Font	A
Fonthill	A
Fox*	A
Foxboro	C
Franktown	B
Freeport	B
Galesburg	B
Gananoque*	C
Gerow	C
Gilford	C
Gobles	C
Gordon*	D
Granby	C
SOIL SERIES	**HYDRO LOGIC SOIL GROUP**
Peat	D
Peel	C
Pelham	A
Perch	D
Percy	B
Perth	C
Petherwick	C
Phipps*	D
Piccadilly	D
Pike	C
Pike Lake	A
Plainfield	A
Pontypool	A
Preston	B
Renfrew	D
Rideau	D
Rubicon*	B
Sargent	A
Saugeen	C
Schomberg	C
Scotland	A
Seely's Bay	C
Senaca	B
Shashawandah	B
Sidney*	D
Silver Hill	B
Simcoe	D
Smithfield	C
Smithville	C
Snedden	D

Leithrim	B
Lily	C
Lincoln	D
Lindsay*	D
Lisbon	A
Listowel	B
Little Current	B
Lockport	B
London*	B
Lonsdale	D
Lovering	C
Lowbanks	B
Lyons*	C
SOIL SERIES	**HYDROLOGIC SOIL GROUP**
Teeswater	B
Tennyson*	B
Thames	C
Thorah	C
Thwaites	B
Tioga*	A
Toledo*	D
Trafalgar	B
Trent	C
Tuscola*	C
Tweed	B
Uplands	A
Vanessa	C
Vars	B
Vasey*	B
Vincent	C
Vineland*	B
Vittoria	C
Wabi	B
Walshear	C
Walsingham	A
Waterloo	A
Watford	A
Watrin	C
Waupoos	C
Wauseon	C
Wayside	B
Welland	D
Wellesley	C
Wemyss	B

Newcastle	B
Niagara	C
Nipissing	C
Norham	B
Normandale	B
North Gower*	D
Oakland	B
Oakview	D
Oneida	C
Ontario	C
Osgoode	C
Oshtemo	A
Osnabruck	D
Osprey	B
Otonabee*	B
Otterskin	C
Parkhill*	C

Solmesville	C
South Bay	C
Springvale	A
St. Clements	C
St. Jacobs	A
St. Peter	A
Ste. Rosalie	D
St. Samuel*	C
St. Thomas	A
St. Williams	B
Stafford	B
Stockdale	C
Styx	B
Sullivan	A
Tansley	C
Tavistock	C
Tecumseh	B

Wendigo	A
Wendover	D
Westmeath	A
Whitby	B
White Lake*	A
Whitfield	B
Wiarton	B
Wilmot	D
Wilsonville	A
Winona	C
Woburn	B
Wolford	C
Wolsey*	D
Wooler	B
Woolwich	B
Wyevale	A

* Soil series having shallow phases over bedrock. The hydrologic grouping for the rocky phases of these soils should be reduced one group (ie. C reduces to B).

** Soil family name not available if not listed.

P. Phosphorus Index

This section needs to be completed if the P soil test exceeds 30 ppm. The P-Index is divided into 5 sections. Add the values from each section to get the total P-Index.

Note: For a more detailed analysis of the Phosphorus Index refer to the Nutrient Management Computer Program (NMAN) or Phosphorus Index Factsheet.

a) Soil Erosion Value

Slope within 500' of watercourse	Length of Slope	Hay	Other Crops Up&Down Slope		Cross Slope	
			Plow	No-till	Plow	No-till
Flat (< 0.5%)	All	2	4	2	4	2
Gentle (0.5–2%)	Short (200 ft)	2	4	2	4	2
Gentle (0.5–2%)	Long (1600 ft)	2	16	4	16	2
Moderate(2-5%)	Short (200 ft)	2	16	2	8	2
Moderate(2-5%)	Long (1600 ft)	2	16	8	16	4
Steep (> 5%)	Short (200 ft)	2	16	4	16	4
Steep (> 5%)	Long (1600 ft)	2	16	16	16	16

Note: These values simulate a worst case scenario of soybeans on very fine sand in a high rainfall area. To obtain more accurate results using the universal soil loss equation refer to the nutrient management computer program (NMAN).

b) Water Runoff Value

Slope	Soil Texture			
	Sand	Loam	Clay Loam	Clay
Flat (1%)	1	1	2	4
Gentle (3%)	1	2	4	8
Moderate(5%)	1	2	4	8
Steep (8%)	2	4	8	8

c) P Soil Test Value

P Soil Test	Factor
< 15 ppm	2
15 - 30 ppm	4
31 - 60 ppm	8
61 - 100 ppm	16
> 100 ppm	32

d) P_2O_5 Fertilizer Value

Rate (Line C)	Method			
(lb / ac)	Placed with Planter	Incorporated < 2 weeks	Incorporated > 2 weeks	Not Incorporated
none	0	0	0	0
< 45	2.5	4	7	13
45 - 67	3.5	5	8	14
> 67	5.5	7	10	16

e) P_2O_5 Manure Value

Rate (Line K)	Method			
(lb / ac)	Injected	Incorporated < 5 days	Not Incorp: Crop Cover	Not Incorp: Bare Soil
None	0	0	0	0
< 33	2.5	4	7	13
33 – 54	3.5	5	8	14
> 54	5.5	7	10	16

Example:

a) corn no-till planted on a 3% slope: 2 b) clay loam soil on a 3% slope: 4
c) P soil test of 35 ppm: 8 d) 9 lb/ac, placed with planter: 2.5
e) 128 lb/ac of P_2O_5 applied in manure, incorporated 3 days: 7
Total P-index = 2 + 4 + 8 + 2.5 + 7 = 23.5

Q Minimum Separation Distance from Watercourse

Use the first chart to determine the surface water runoff potential:

Soil Hydrologic Group	Maximum Sustained Field Slope			
	< 3 %	3 - 6 %	6 - 9 %	9-12 %
A (Rapid)	Very Low	Very Low	Low	High
B (Moderate)	Very Low	Low	Moderate	High
C (Slow)	Low	Moderate	High	No Application
D (Very Slow)	Moderate	High	High	No Application

Use the runoff potential to determine the minimum separation distance.

Minimum Separation Distance (with established buffer zone)

Runoff Potential	Surface Applied		Incorporated or Pretilled	
	Liquid	Solid	Liquid	Solid
High	100 ft	50 ft	60 ft	30 ft
Moderate	75 ft	40 ft	45 ft	20 ft
Low	50 ft	30 ft	30 ft	15 ft
Very Low	30 ft	30 ft	10 ft	10 ft

Note: All farms that require a nutrient management plan must have a minimum 10 foot vegetated buffer adjacent to all surface water. On farms that do not require a nutrient management plan, and do

not have buffers established, the minimum distance to surface water is 33 feet for solid manure, and 66 feet for liquid manure or biosolids

If the phosphorus index has been calculated make sure that the minimum separation distance falls into an acceptable category in the following chart. If not increase the separation distance or lower the P_2O_5 application rate.

P- Index	Separation Distance			
	< 10 ft	10 – 100 ft	100 – 200 ft	> 200 ft
< 30		⚠	No additional restriction due to P-Index	
30 – 50		Only apply P_2O_5 up to crop removal (Line M ≤ 0)		
> 50	STOP	No application		

Nutrient management Practices BMP

Example:
For a clay loam soil on a 4% slope the runoff potential is *moderate*. For surface applied manure the minimum separation distance is 75 ft. However, since the phosphorus index was completed and P_2O_5 is applied above crop removal (i.e. Line M > 0) the minimum distance must be increased to 100 ft. Between 75 ft and 100 ft manure could be applied up to crop removal.

Nutrient Management Protocols
For
Ontario Regulations
Made under the
Nutrient Management Act, 2002

Construction and Siting Protocol

Draft for Discussion Purposes Only

November, 2002

Province of Ontario
Ministry of Agriculture and Food

DRAFT PROTOCOLS
for Construction and Siting
November 29, 2002

Table of Contents

NSTS-01 ENGINEERING AND INSPECTION

SECTION 1 - PURPOSE AND SCOPE

1.1 This document outlines the role and responsibilities of the Engineer for the design, inspection, and general review of construction for a permanent nutrient storage facility.

1.2 In this document, "engineer" means a person who hold holds a licence or a temporary licence under the *Professional Engineers Act* but does not include a person who holds a limited licence under that Act.

"permanent nutrient storage facility" includes a structure that is intended to hold liquid or solid nutrients but does not include a temporary in-field nutrient storage facility.

SECTION 2 – GENERAL REQUIREMENTS

2.1 No person shall commence a new livestock operation or expand an existing livestock operation that generates **liquid** manure that does not include as part of the farm unit a permanent nutrient storage facility or facilities that is or are capable of containing at least all of the nutrient produced on or received at the operation for a period of 240 days with the following exceptions:

(a) a farmer who sends some of the nutrient generated on the farmer's agricultural operation to a broker and that broker require an aggregate storage capacity of 240 days between the farmer and the broker; or

(b) where the period of use of a permanent livestock confinement area is less than 240 days the storage capacity of the permanent nutrient storage facility associated with the area must be adequate for the period of confinement.

2.2 No person shall commence a new livestock operation or expand an existing livestock operation that generates **solid** manure that does not include as part of the farm unit a permanent nutrient storage facility or facilities that is or are capable of containing at least all of the nutrient produced on or received at the operation for a period of 240 days with the following exceptions:

(a) a farmer who sends some of the nutrient generated on the farmer's agricultural operation to a broker and that broker require an aggregate storage capacity of 240 days between the farmer and the broker; or

(b) the farmer's nutrient management strategy provides for the disposal of the nutrient generated for the agricultural operation by means that eliminate the need for 240 days of nutrient storage on the operation; or

(c) where the period of use of a permanent livestock confinement area is less than 240 days the storage capacity of the permanent nutrient storage facility associated with the area must be adequate for the period of confinement;

2.3 Except as noted in subsection 2.4, the design and construction of a new permanent nutrient storage facility or an expansion, or alteration of an existing permanent nutrient storage facility or part thereof shall be carried out by or under the supervision of an Engineer.

2.4 The design and construction of a permanent solid nutrient storage facility having a floor area of 600 m^2 or less with nutrient supporting retaining walls not exceeding 1200 mm in height above the floor may be carried out by a person who is not an engineer.

2.5 In Ontario, an engineer who designs a permanent nutrient storage facility must adhere to all applicable Regulations and Nutrient Storage Technical Standards (MSTS) Protocols under the *Nutrient Management Act, 2002,* the Ontario Building Code (OBC), the National Farm Building Code of Canada (NFBC) and all other applicable standards.

SECTION 3 – INFORMATION REQUIREMENTS

3.1. Submission Requirements– In conjunction with each design, the engineer shall submit the following information to the appropriate regulatory agency for each project that involves the construction of a new permanent nutrient storage facility or the enlargement, or alteration of an existing facility:

a. A site plan showing the location of the proposed new permanent nutrient storage facility or the existing permanent nutrient storage facility and the proposed addition or alteration thereto and spatial separation distances as outlined in NSTS-02;
b. A geotechnical investigation report showing relevant sub-surface information pertaining to the site characterization as outlined in NSTS-03, where applicable;
c. Detailed construction drawings for steel or concrete permanent nutrient storage facilities in accordance with NSTS-04 , where applicable;
d. Detailed construction drawings for earthen permanent nutrient storage in accordance with NSTS-06, where applicable;
e. Detailed construction drawings for synthetic or clay liners in accordance with NSTS-07, where applicable;
f. Details for seepage monitoring and leak detection in accordance with NSTS-09, where applicable; and
g. Detailed construction drawings of all transfer systems for liquid nutrients in accordance with NSTS-10, where applicable.

3.2 Design Provisions - The design of a permanent nutrient storage facility prepared by an Engineer shall contain:

a. The projected nutrient produced and received, as determined by NMAN/MSTOR software, taking into account the projected total amount of nutrient to be produced, precipitation over the storage period, accumulation of solids, other materials to be stored (such as wash water) and a freeboard allowance;
b. Provisions for loading the facility, agitating the contents, and emptying the facility, where applicable;
c. A recommendation for regular inspection and maintenance, where applicable;
d. Details for the ventilation system for elimination of corrosive gases, where applicable;
e. Details for safety fences or guards in accordance with NFBC Section 4.1.1.4. where applicable; and
f. Signage that clearly describes the risk of manure gas in accordance with NFBC Section 4.2.4.1.

SECTION 4 - QUALITY ASSURANCE

4.1. General Review – A person who intends to construct or have constructed a permanent nutrient storage facility that is required to be designed by an engineer shall ensure that an engineer is retained to undertake the general review of construction in accordance with the performance standards (see notes in Form B of this protocol) of the Professional Engineers Ontario (PEO).

4.2 A person who constructs or has constructed a permanent nutrient storage facility that is required to be designed by an engineer shall complete the Engineer's General Review / Commitment Certificate (Form A) and General Review (Form B) and submit them to the appropriate regulatory authority.

4.3. Inspection and Testing - During construction, the Engineer may request inspection and testing be performed by an independent agency or professional engineer. All inspection and testing shall conform to applicable codes and standards.

4.4. Written Reports - where applicable, the Engineer shall provide the appropriate regulatory agency with copies of written reports arising out of the general review. Where required, a final letter confirming that the proposed structure has been constructed in general conformity with the approved drawings, specifications, and other documents shall be forwarded to the regulatory agency and provided to the client.

Nutrient Storage Technical Standard – 01
Form A

ENGINEER'S COMMITMENT CERTIFICATE

Project: _____
Name / Location

This is to Certify that: _____ _____ _____
Engineer Signature Date

has been retained to undertake the overall coordination of design for the permanent nutrient storage facility in accordance with NSTS-01 (Engineering and Inspection).

_____ _____ _____
Owner Signature Date

Components of the design shall be performed by the Engineer or allocated to other engineering disciplines according to the following checklist:

Submission Requirements - (To the Regulatory Agency where applicable)	NSTS Standard	Design Required
Site Plan – Location of manure storage structure relevant to spatial separations.	NSTS-02	
Geotechnical Investigation - Sub-surface information relevant to site characterization	NSTS-03	
Liquid Storage Structures - Drawings and details for liquid storage construction.	NSTS-04	
Solid Storage Structures – Drawings and details for solid storage construction.	NSTS-05	
Earthen Storage Structures - Drawings and details for earthen storage construction	NSTS-06	
Synthetic or Natural Liner - Drawings and details for liner construction.	NSTS-07	
Monitoring System – Details for seepage and monitoring and leak detection.	NSTS-09	
Transfer Systems – Drawings and details for transfer systems construction.	NSTS-10	

In accordance with NSTS-01 Section 4.3, the design of a permanent nutrient storage facility prepared by an Engineer shall contain:

a. The anticipated nutrient produced and received, as determined by NMAN/MSTOR software, taking into account the total projected amount of nutrient to be produced, precipitation over the storage period, accumulation of solids and other materials to be stored (such as wash water), and a freeboard allowance;
b. Provisions for loading the facility, agitating the contents and emptying the facility;
c. A recommendation for regular inspection and maintenance, where applicable;
d. Details for the ventilation system for elimination of corrosive gases, if applicable.
e. Details for safety fences or guards in accordance with NFBC Section 4.1.1.4. where applicable; and
f. Signage that clearly describes the risk of manure gas in accordance with NFBC Section 4.2.4.1.

Nutrient Storage Technical Standard – 01
Form B

GENERAL REVIEW / COMMITMENT CERTIFICATE

Project: _____
Name / Location

This is to Certify that: _____ _____ _____
Engineer Signature Date
has been retained to undertake the general review of the construction of the permanent nutrient storage structure in accordance with the NSTS-01 (Engineering and Inspection) and Section 78, Regulation 941, RRO 1990, as amended, and the Professional Engineers Act.

_____ _____ _____
Owner Signature Date

Components of the review shall be performed by the Engineer or allocated to other engineering disciplines according to the following table:

Function	Engineer / Address	Name / Signature
Site Plan		
Geotechnical*		
Storage Structure		
Monitoring System		
Transfer Systems		

* Member of the Association of Geoscientists of Ontario

The Professional Engineers Act

The following are prescribed as performance standards with respect to the general review of the construction, enlargement or alteration of a building by a professional engineer as provided for in the building code made under the Building Code Act:

1. The professional engineer, with respect to the matters that are governed by the building code, shall,
   i) Make periodic visits to the site to determine whether the work is in general conformity with the plans and specifications;
   ii) Record deficiencies found during site visits and provide the client, the contractor and the owner with written reports of the deficiencies and the actions that must be taken to rectify the deficiencies. Review the reports of independent inspection and testing companies called for in the plans and specifications and which pertain directly to the work being reviewed;
   iv) Interpret plans and specifications when requested to do so by their client, contractor or owner; and
   v) Review shop drawings and samples submitted by the contractor for consistency with the intent of the plans and specifications.
2. The professional engineer shall not review work in disciplines in which the professional engineer is not qualified.
3. The professional engineer may delegate one or more of the functions described in paragraph 1 to another person where it is consistent with prudent engineering practice to do so and the functions are performed under the supervision of the professional engineer.

NSTS-02 SPATIAL SEPARATION

Siting:

1. No person shall construct a permanent nutrient storage facility or expand an existing permanent nutrient storage facility except in accordance with the requirements of the Minimum Distance Separation II document and any associated amendments or clarifications published by the Ministry of Agriculture and Food and any set back distances established by the Nutrient Management Act regulations, unless the municipality or the Director approves a variance from the requirements of MDS II or the Director approves a variance from the requirements of the regulations to mitigate an effect on the natural environment resulting from such construction.

Separation distance between groundwater sources and agricultural structures capable of generating, storing and handling potential groundwater contaminates:

2. No person shall establish or construct a permanent nutrient storage facility or expand an existing permanent nutrient storage facility:

(a) within 15 metres of a well that has a continuous steel casing that extends at least 6 metres below the surface of the ground;
(b) within 100 metres of a well that supplies water to a municipal water system; or
(c) within 30 metres of any other well.

3. Subject to section 6, no person shall construct a permanent nutrient storage facility or expand an existing permanent nutrient storage facility without:

a) locating all field drainage tiles or piped municipal drains within 15 metres of the perimeter of the facility;

b) removing all drainage tile within the 15 metre zone around the facility in accordance with the OMAF publication entitled "Nutrient Storage Facilities and Tile Drainage Systems"; and

c) redirecting the flow of the field drainage system or piped municipal drain away from the facility.

d) receiving approval for any modification affecting a municipal drain under the *Drainage Act.*

4. No person shall construct a permanent nutrient storage facility or expand an existing permanent nutrient storage facility that does not have a flow path that is at least 50 metres long to the top of the bank of the nearest surface water unless the surface water is an artificial facility intended to collect, re-circulate or otherwise manage contaminated runoff from the facility.

5. No person shall construct a permanent nutrient storage facility or expand an existing permanent nutrient storage facility within the regional or 1 in 100 year flood lines established by the municipality or by the local Conservation Authority unless,

(a) the Director is satisfied that the location of the facility does not affect the control of flooding or pollution or the conservation of the land; or

(b) a permit for the facility is issued under section 28 of the *Conservation Authorities Act.*

6. (1) A person who constructs a drainage system, within 15 metres of a permanent nutrient storage facility, that is intended to collect or divert water away from the facility shall ensure that the system is constructed with non-perforated pipe and that all subsurface joints in the piping are properly sealed unless,

(a) water collected by the drainage system discharges into an approved treatment system; or

(b) the foundation drains of the permanent nutrient storage facility are equipped with an observation and shut-off station that has been installed in accordance with the OMAF publication entitled "Nutrient Storage Facilities and Tile Drainage Systems".

(2) No person shall permit liquid nutrients to enter a tile drainage system unless the system is equipped with a treatment system approved by the Director and designed to treat effluent containing such nutrients.

NSTS-03 SITE CHARACTERIZATION AND ASSESSMENT

PURPOSE AND SCOPE - All permanent nutrient storage facilities must meet the standards set in this protocol with the exception of: Solid Nutrient Storage Facilities as outlined in NSTS – 05, for Category 1 through 3 operations.

1.0 DEFINITIONS

1.1 In this document,

"*Professional geoscientist*" means a member of the Association of Geoscientists of Ontario.

"*Hydraulically Secure Soil*" means natural material such as soil below a nutrient storage structure that is consistent in nature and able to meet a specified maximum hydraulic conductivity of 1×10^{-8} metres per second. The criterion of homogeneity is established from the soil boring logs and sample analysis data from the site investigation. The criterion of hydraulic conductivity of the material may be established using either one of the following tests:

a) Standard in-situ or laboratory testing procedures according to American Society for Testing and Materials (ASTM) or Canadian Standards Association (CSA) standards; or
b) Particle size analysis and Atterberg test data. The materials shall meet the following minimum criteria:

Particle Size Analysis

- Percent Fines: = 50%
- Clay Content: = 20%
- Sand Content: ≤ 45%
- Gravel Content ≤ 50%

Atterberg Limits

- Plasticity Index (PI): 20% ≤ PI ≤ 30%
- Liquid Limit (LL): 30% ≤ LL ≤ 60%

Where the soil below a structure does not meet the maximum hydraulic conductivity criteria of 1×10^{-8} m/sec., the proponent is required to meet the equivalent standard either through engineering design or by the use of an accepted alternative technology, approved by the Director. For example, if the hydraulic conductivity of the material below the site were greater than the specified minimum, the presence of an additional depth of more permeable material could be shown to create an equivalent level of protection. Alternatively, if the natural site characteristics cannot meet the criteria set out in the protocol, an engineered liner system can be employed to create the equivalent level of protection. The Engineer must verify the hydraulic equivalency of the site characteristics or the engineered design through appropriate calculations or groundwater modeling exercises.

2.0 REQUIRED SUBSURFACE ASSESSMENTS

2.1 Where available, the professional engineer or professional geoscientist, shall obtain for the purpose of site characterization and assessment, the following information:

a) Topographic maps;
b) Quaternary geology maps;
c) Hydrogeological or septic suitability reports;
d) Provincial soils maps;
e) MOE Well Construction records;
f) MOE Hydrogeological files and/or maps;
g) Well water quality data

Data obtained from these sources will assist the professional engineer or professional geoscientist in identifying characteristics of the site requiring special consideration.

2.2 No person shall construct or expand a permanent liquid nutrient storage facility for agricultural source material unless the person retains the services of a professional engineer or professional geoscientist to carry out a stage one hydrogeologic or geotechnical investigation of the proposed site that,

(a) identifies the soil type or types to a depth of at least,
  (i) 1.5 metres below the lowest elevation of the excavation required for a structure made of concrete or steel; or
  (ii) 2.5 metres below the lowest elevation of the excavation required for an earthen structure; and
(b) establishes the depth of the aquifer and bedrock in relation to the lowest elevation of the excavation required for the facility.

2.3 Subject to section 2.12, no person shall construct or expand a permanent liquid nutrient storage facility for agricultural source material on a site that does not meet or exceed the following requirements:

a) unlined concrete or steel storage facilities, with reinforced concrete floors (Figure 1) require a minimum of 0.5 metre of hydraulically secure soil between the bottom of the storage facility and the upper most identified bedrock layer or aquifer;
b) lined concrete or steel storage facilities with reinforced concrete floors (Figure 2) require a minimum of 0.5 metre of native undisturbed material or compacted granular material between the bottom of the storage facility and uppermost identified bedrock layer or aquifer;
c) unlined concrete or steel storage facilities with unreinforced concrete floors (Figure 3) require a minimum of 1.0 metre of hydraulically secure soil between the bottom and sides of the storage facility and the upper most identified bedrock layer or aquifer;
d) lined concrete or steel storage facilities with unreinforced concrete floors (Figure 4) require a minimum of 1.0 metre of native undisturbed material or compacted granular material between the bottom of the storage facility and the uppermost identified bedrock layer or aquifer;
e) lined earthen nutrient storage facilities (Figure 6) require a minimum of 2.0 metres of hydraulically secure soil between the bottom and sides of the lined storage facility and the upper most identified bedrock layer or aquifer; and
f) nutrient storage facilities that are designed to incorporate a combined system such as a facility that has earthen walls and a concrete floor shall satisfy the most restrictive criteria for the types of material used in the construction of the facility.

2.4 Subject to section 2.12, no person shall construct a permanent solid nutrient storage facility or expand such a facility on a category 4 agricultural operation that does not contain a concrete floor unless, the

person retains the services of a professional engineer or professional geoscientist to complete a stage one hydrogeologic or geotechnical investigation of the proposed site that establishes,

(a) the soil type or types to a depth of 1.5 m below the lowest elevation of the excavation required for the facility; and
(b) that there is at least 0.5 metre of hydraulically secure soil between the bottom of the facility and the uppermost identified bedrock or aquifer.

2.5 An unlined permanent earthen nutrient storage facility (Figure 5), with a maximum storage depth of 3.0 metres and a maximum storage volume of 2500 m^3, can be used to store liquid agricultural source materials listed in paragraphs 2 through 6 of section 1.6 (1) of the Nutrient Management Act regulations if;

a) the facility has at least 2.0 metres of hydraulically secure material between the bottom and sides of the facility and the upper most identified bedrock layer or unconfined aquifer;
b) the soil materials that form the interior surface of the proposed facility are disked to a depth of at least 150 millimetres and compacted with an approved compaction device as specified in NSTS – 07b; and
c) any soil anomalies that are discovered during construction, such as course material lenses, large rocks or soil fractures shall be excavated and filled with hydraulically secure soil to a depth of one metre;
d) topsoil shall be stripped to the subsoil layer from the area where any berm is to be constructed and stockpiled for use in the outside slopes of the structure; and
e) any above ground berms shall be constructed of a material that is suitable for compaction to meet a maximum saturated hydraulic conductivity of 1 x 10^{-9} metres per second and be compacted to at least 95% modified Proctor according to accepted engineering test criteria (according to ASTM D0698)

2.6 The professional engineer or professional geoscientist responsible for the investigation referred to in sections 2.2 and 2.4 shall analyze the data collected for the site characterization study to determine the suitability of the proposed site for a permanent liquid manure storage facility or a permanent solid manure storage facility with an earthen floor located on a category 4 agricultural operation.

2.7 If the results of the stage one hydrogeologic or geotechnical investigation confirm that appropriate site conditions, as listed in sections 2.3 through 2.5 exist beneath and adjacent to the proposed site then the proponent may proceed with construction of the facility. Section 2.13 provides additional requirements for the site investigation.

2.8 If the results of the stage one hydrogeologic or geotechnical investigation do not confirm the suitability of the proposed site for the construction and operation of a permanent liquid manure storage facility the owner of the proposed facility may,

(a) look for another site;
(b) construct a facility that is suitable for the site in accordance with sections 2.3 through 2.5; or
(c) carry out a stage two investigation of the proposed site in accordance with the applicable Ministry protocol.

2.9 If the results of the stage two hydrogeologic or geotechnical investigation confirm that appropriate site conditions as listed in sections 2.3 through 2.5 exist beneath and adjacent to the proposed site then the owner may proceed with construction or the nutrient storage facility. Section 2.13 provides additional requirements for the site investigation.

2.10 If the results of the stage two hydrogeologic or geotechnical investigation fail to confirm that the proposed site is a suitable location for the proposed facility the owner may,

a) look for another site;
b) construct a facility that is suitable for the site in accordance with sections 2.3 through 2.5; or
c) conduct a stage-three investigation of the proposed site.

2.11 If the proponent elects to conduct a stage-three hydrogeologic or geotechnical investigation of the proposed site the terms of reference for the stage three investigation shall be developed by the ~~proponent's~~ professional engineer or professional geoscientist to determine what measures could be used to provide adequate protection for the ground water and approved by the Director.

2.12 If the results of the stage three hydrogeologic or geotechnical investigation fails to confirm that the proposed site is a suitable location for the proposed facility the owner may,

a) look for another site;
b) construct a facility that is suitable for the site in accordance with sections 2.3 through 2.5; or
c) have a qualified professional develop an appropriate design, specific to the site, which will provide a level of protection for the groundwater which is the equivalent of the structures listed in sections 2.3 through 2.5.

2.13 Stage one of the hydrogeologic or geotechnical investigation shall have a minimum of one borehole per 1000 m^2 of facility's ground floor area. Stage two of the hydrogeologic or geotechnical investigation shall have a minimum if one borehole per 500 m^2 of the proposed facility's footprint area. Boreholes must be sealed according to the methodologies described in the OMAF, Agriculture and Agri-Food Canada, Best Management Practices; *Water Wells* publication when they are abandoned after use.

References:

ASTM D0698 *Standard Test Method for Laboratory Compaction Characteristics of Soil using Standard Effort*
OMAF, Agriculture and Agri-Food Canada, Best Management Practices; *Water Wells*, ISBN 0-7778-6149-6

Nutrient Storage Types:

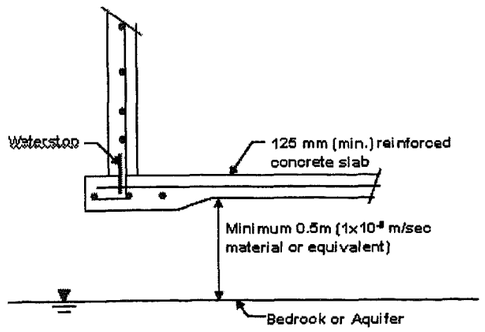


Figure 1 - Unlined, Reinforced Floor

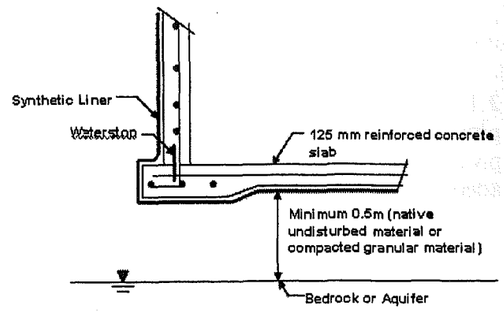


Figure 2 - Lined, Reinforced Floor

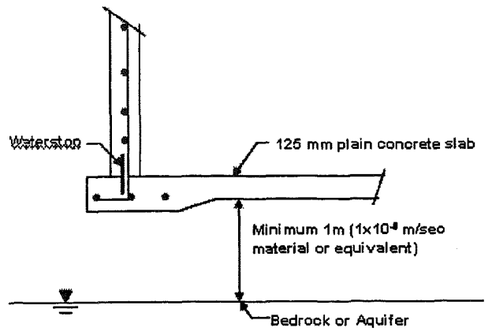


Figure 3 - Unlined, Unreinforced Floor

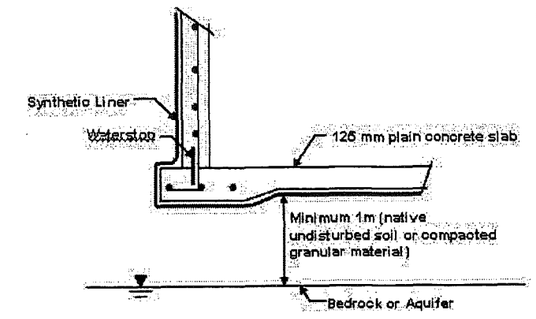


Figure 4 - Lined, Unreinforced Floor

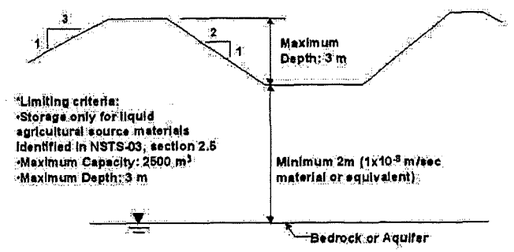


Figure 5 - Earthen Runoff Storage

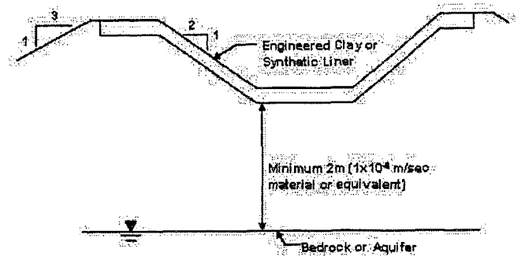


Figure 6 - Lined, Earthen Nutrient Storage Structure

NSTS-04 CONCRETE AND STEEL (OR EQUIVALENT) STORAGE STRUCTURES

SECTION 1 - PURPOSE AND SCOPE

1.1. Purpose of the Protocol – This protocol defines the engineering requirements for the design of steel and concrete structures (or equivalent - see section 2, EQUIVALENTS) used for the storage of liquid nutrient in agricultural applications. The information that is required for the structural analysis and approval of a liquid nutrient storage structure is specified or referenced herein. For earthen nutrient storage structures, refer to NSTS-06.

1.2. Objective of the Design –The primary objective for the design of a liquid nutrient storage structure is the economical construction of a watertight structure that is designed to provide public and environmental protection. A professional engineer in accordance with NSTS-01 shall design the structure to be watertight, corrosion resistant and structurally safe and sound.

1.3. Watertight Design – The ability of the structure to be watertight and minimize leakage will be reasonably assured if:

a. Adequate structural resistance is provided for the intended design loads and serviceability;
b. Joints are properly spaced, sized, and constructed for the application;
c. Joints and penetrations are made watertight with the appropriate use of water-stops, caulking, gaskets, or sealants;
d. Exposure conditions are clearly identified;
e. Crack widths in concrete are minimized as described in section 6.2 of this protocol; and
f. Impervious protective coatings or barriers are used where required;

1.4. Leakage – New, properly engineered structures may contain small cracks that will allow minimal quantities of leakage to occur. It is anticipated that these cracks will seal after a relatively short period of exposure to manure and other nutrients. The engineer shall provide an estimate of the expected leakage rate. If leakage is found to be occurring at a rate higher than outlined by the engineer, the local district office of the Ministry of the Environment shall be notified. At no time shall leakage from a nutrient storage facility cause adverse effect under the Environmental Protection Act, Section 14.

1.5. Durability – The materials used in the construction of a liquid nutrient storage structure shall be resistant to the effects of its environment. In particular,

a. Cathodic protection in combination with coatings or liners shall be used to protect the steel tanks from the corrosive action of liquid manure and manure gases, or other corrosive actions that may occur as a result of other nutrients stored at the facility;
b. Concrete should be resistant to the action of liquid manure, alternate wetting and drying, freezing and thawing cycles, exposure to the elements, and exposure to manure gases where appropriate. The durability requirements of concrete shall conform to CSA A23.1 Section 15.

SECTION 2 - EQUIVALENTS

2.1. General - The provisions in this protocol are not intended to limit the appropriate use of materials, systems, equipment, and procedures not specifically described herein.

2.2. Alternatives – Alternatives not specifically described herein, or which may vary from specific requirements of this Protocol, or for which no specified test procedure has been established, are permitted to be used:

a. If it can be shown that these alternatives are based on sound engineering principles and are equivalent on the basis of tests, evaluation or past performance; and
b. If the Director is satisfied that these alternatives provide a level of public and environmental protection that is equivalent to the performance required by this protocol.

SECTION 3 – SECONDARY CONTAINMENT

3.1. General – Except as provided in NSTS-03, section 2.5, all liquid nutrient storage structures shall have provision for two levels of containment to control leakage.

3.2. Below Ground Tanks – The soil conditions described in NSTS-03 (site characterization) for nutrient storage structures is intended to provide the second level of containment for the floor and below ground portion of the walls.

3.2.1. In some soil types and situations, as defined in NSTS-03, an engineered synthetic or natural liner, constructed in accordance with NSTS-07a and NSTS-07b could be required.

3.2.2. Membranes, where required, shall be continuous under the floor and footings and shall extend up the wall to a level equal with the top of the ground surface or as specified by the project engineer.

3.3. Above Ground Tanks – Except as permitted in Section 3.4, the above grade portion of a liquid nutrient storage structure shall have a secondary containment system with a capacity equivalent to 110% of the above ground portion of the storage tank.

3.4. Exclusion – An engineer may specify that a secondary containment system is not required for above ground tanks where:

a. The load factor a_L defined in the Ontario Building Code, Section 4.1.3.2. (4) for liquid loads provided in Clause 4.4 (a) is increased to 1.5; and
b. Cracks in concrete are required to be filled with appropriate construction material that prevents leakage of stored nutrient from the storage facility.; and
c. The engineer specifies that the storage and landscape features around the storage facility are adequate to ensure that a secondary containment system is not required.

3.5. Containment Berms – The secondary containment system shall consist of a bermed area with a low permeability barrier that conforms to the following performance specifications:

a. Concrete barriers shall:
   i. be designed and installed according to engineering standards;
   ii. be a minimum of 100 mm thick;
   iii. be constructed on native undisturbed soil or compacted granular material; and
   iv. have expansion joints located at least every 6 m sealed with a sealant that is compatible with the product being stored.
b. Clay barriers shall:
   i. be designed and installed according to engineering standards;
   ii. be a minimum of 300 mm thick;
   iii. be chemically compatible with the native soil and cover material; and
   iv. be covered with a minimum of 300 mm of material to prevent drying of the clay barrier.

3.6. Surface Water – Surface water, including rainwater, shall not be permitted to accumulate around the tank or in the containment area. The grade around tanks and within berms shall have a positive slope away from the tank toward a sump where liquids and surface water can be collected and removed.

3.7. Ground Level – The ground level shall be defined as the lowest surface grade within a 2 m perimeter of the tank. The slope of the grade away from the structure, beyond the 2 m perimeter shall not exceed a 3:1 horizontal to vertical ratio.

SECTION 4 - DESIGN CRITERIA

4.1. General – Liquid nutrient storage structures shall be designed to withstand all loads and load combinations reasonably anticipated during construction and operation in accordance with the most recent version of the Ontario Building Code (OBC), the National Farm Building Code of Canada (NFBC), and applicable CSA Standards.

4.2. Limit States Design – The structural design of liquid nutrient storage structures shall comply with all CSA Limit States Design Standards, which require that the specified strength of all components shall equal or exceed all factored loads.

4.3. Importance Factor – The NFBC allows the use of an importance factor of 0.8 for farm structures with low human occupancy. However, an importance factor of 1.0 shall be used for the design of liquid nutrient storage structures.

4.4. Liquid Loads –The walls and floor of a liquid nutrient storage structure shall be designed for liquid loads with:

a. Except as noted in section 3.4, the load factor a_L as defined in the Ontario Building Code, Section 4.1.3.2. (4) of 1.25, similar to dead loads, since the liquid load can be accurately calculated;
b. An equivalent fluid density of 10 kN/m^3;
c. A liquid head equal to the maximum height of liquid that the structure can contain; and
d. An allowance for unequal liquid levels on each side of an interior partition. A minimum pressure differential of 0.5 kPa is recommended for all walls even if equal liquid levels can be maintained on each side of the wall.

4.5. Ice Loads – Walls and other structural components shall be designed for ice loads in accordance with the NFBC. Based on testing, horizontal ice pressures of 50 kPa acting over a height of 0.5 m at the surface level of the liquid are recommended. The thickness of ice can be reduced proportionally to the number of degree days below 18 C as listed in OBC, Table 2.5.1.1., Column 6.

4.6. Soil and Backfill Loads – Recommended design values for earth loads on underground structures are provided in NFBC Section 2.2.1.13.

4.6.1. Where backfill in excess of 1.5 m is to be part of the design, investigative soil testing is required.

4.6.2. Where horizontal soil pressures are used to offset the pressure exerted by the nutrient storage contents, the engineer shall specify the backfill material and the required compaction.

4.6.3. The backfill shall be placed evenly around the nutrient storage structure. The surface of the

backfill shall be sloped to ensure positive drainage away from the walls before and after settlement.

4.6.4. The design shall allow for increased loads due to uneven grades or ramps where required.

4.6.5. Exterior walls below grade shall be designed for surcharge loading from anticipated wheel traffic such as manure tankers and tractors. Design values for vehicle traffic are provided in the NFBC and OBC.

4.6.6. Backfill shall be installed around the foundation of a nutrient storage structure to provide adequate soil cover for frost protection unless the engineer uses an alternate design method.

4.7. Frost Loads – Adequate protection from frost action shall be provided to footings, floors, and walls. Under normal operation, damage to internal components such as floors from frost action is not a concern because the storage contains unfrozen nutrient of sufficient depth to prevent freezing. However, if the storage is left unused over the winter, special precautions to prevent frost heaving and damage (such as covering the floor with straw or liquids) are required.

4.8. Temperature Stress – The design of a concrete nutrient storage structure shall account for temperature-induced stresses, during both summer and winter seasons, resulting from:

a. Temperature variations between the above and below ground portions of the wall; and
b. Temperature differences between the inside and outside faces of the wall.

4.9. Wind Loads - The specified external pressure or suction due to wind on part or all of a surface of a wall shall be calculated according to Part 4 of the OBC.

4.10. Other Loads - When applicable, other loads such as dead loads, creep and shrinkage of the concrete or steel, floor loads, machinery loads, and snow loads shall be considered in the design of structural components.

SECTION 5 - FOUNDATIONS AND FLOORS

5.1. Soil Bearing Capacity and Uniformity of Base – The engineer shall ensure that the allowable bearing capacity and uniformity of base materials is appropriate for the foundation loads and method of construction.

5.2. Sub-Grade Preparation – The existing sub grade shall be cleared of all stones, topsoil, wood, mud and other deleterious material. Soft areas shall be over-excavated and replaced with engineer approved fill placed in 150 mm lifts and compacted to 98% Standard Proctor Density. The sub-grade shall be free of frost before concrete placement begins.

5.3. Ground Water – When designing concrete floors for liquid nutrient storage structures, high water table conditions shall be avoided or prevented. This shall be predetermined in a study of the site characterization as per NSTS-03.

5.3.1. A concrete nutrient storage structure shall not be built in such a manner or location that the water table may rise above the floor unless a properly designed drainage system is installed.

5.3.2. Drain tiles shall be installed at the discretion of the engineer around the perimeter of nutrient storage structures below the level of the floor. The drain tiles shall be connected to a controlled outlet

or sump. Sump pumps shall be adequately sized for each installation, taking into account the permeability of the local soils and size of collection area. For additional information, see OMAF publication, "Nutrient Storage Facilities and Tile Drainage Systems"

5.4. Structural Design – The design of concrete footings and floor slabs on grade in liquid nutrient storage structures shall conform to the requirements of CSA A23.3 "Design of Concrete Structures for Building".

5.4.1. The minimum thickness of all slabs on grade in liquid nutrient storage structures shall be 125 mm or as required to satisfy concrete cover requirements.

5.4.2. Except as noted in Sentence 5.4.3., floor slabs on grade shall be designed as reinforced concrete slabs and shall support the intended loads and meet serviceability requirements where:

a. Reinforcement is provided in both directions and spaced no further apart than 5 times the slab thickness nor 500 mm; and
b. The minimum ratio of reinforcement steel area to gross concrete area is 0.0002.

5.4.3. Plain concrete footings or slabs on grade are permitted where:

a. There is a minimum of 1.0 m of natural, uniform material with a hydraulic conductivity of no more than 1×10^{-8} m/s directly below the slab as permitted in NSTS-03; and
b. The strength of plain concrete can resist the design loads applied in accordance with CSA A23.3 Section 22.

5.4.4. The design method shall provide for adequate structural strength and serviceability.

5.4.4.1. Cracking shall be controlled by the proper use and construction of control joints, expansion joints, and isolation joints as specified by the engineer.

5.4.4.2. Alternatively, an acceptable method of construction is an appropriately designed, joint-free floor slab with enough reinforcing to limit shrinkage or stress cracks. Such a design, however, may be limited by the floor area and loading criteria.

5.4.4.3. Effective vibratory equipment during concrete placement shall be used to achieve the concrete density and uniformity necessary for impermeability.

SECTION 6 – CONCRETE WALLS

6.1. General – The design of concrete walls in liquid nutrient storage structures shall conform to the requirements of CSA A23.3 "Design of Concrete Structures for Building".

6.2. Reinforced Concrete – Walls designed to prevent the leakage of the contents shall be reinforced to support the intended loads with:

a. A minimum ratio of vertical reinforcement area to gross concrete area of 0.0015;
b. A minimum ratio of horizontal reinforcement area to gross concrete of 0.0002;
c. Vertical and horizontal reinforcement spaced no further apart than 500 mm or 3 times the wall thickness.

6.2. Crack Widths – Except as noted in section 3.4.(b), the steel reinforcing in walls subjected to bending or direct tension shall be so proportioned to limit crack width of 0.33 mm as required for an exterior exposure.

6.3. Unreinforced concrete walls are permitted only where the wall is non-structural and not intended to prevent the leakage of the contents and shall be constructed in accordance with CSA A23.3 Section 22.

6.4. Joints in Walls – Leakage through tank walls occur mostly at joints, so these require special attention. Horizontal joints in walls should be avoided. PVC or other reliable waterstops are required along the joint between the wall and the concrete base and other locations as specified by the engineer.

SECTION 7 – STEEL WALLS

7.1. General – The most common type of steel nutrient storage tank is a pre-engineered, bolted assembly that is made from corrosion resistant glass fused to steel panels. Other non-typical tanks include plastic lined steel tanks.

7.2. Structural Design – Liquid nutrient storage structures made of structural steel shall conform to CSA S16.1, "Limit States Design of Steel Structures". Other design criteria for steel structures can be taken from the AISC "Specification for Structural Steel Buildings" and AWWA Standard D103.

7.3. Steel Grades – Seven acceptable grades of structural steel are covered in CSA A16.1 and CSA G40.21.

7.4. Corrosion Protection – Steel panels shall be protected from corrosion with a permanent lining, coating, or treatment on both the inside and outside, combined with cathodic protection. The preferred lining is one that is factory installed such as glass fused to steel, however other spray on *or plastic sheet liners* may be acceptable if they are properly designed, installed and monitored for leaks. *Plastic sheet liners must be properly secured to the steel walls to prevent wind damage.*

7.5. Cathodic Protection – Cathodic protection shall be used as a backup protection system to reduce the rate of corrosion where the lining fails or becomes damaged. Cathodic protection is addressed by Underwriters Laboratories of Canada Standard CAN/ULC-S603.1-92, Standard for Galvanic Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids, Second Edition, 1992.

7.5.1. The use of cathodic protection requires the use of a sacrificial anode consisting of a metal that has a greater need to move to it's natural state than iron, and then to tie the anode to the steel assembly with a conduit or cable.

7.5.2. Over time the capability of the anode is reduced as its size decreases. A Manufacturer's technical representative using specialized equipment should monitor the effectiveness of the anode periodically (approximately every 3 years). Anodes must be replaced when most of its material has been sacrificed and can no longer provide the required protection.

7.5.3. Although nowhere near as common as the anode system, the same protection can be provided by an impressed current from a controlled electrical source.

7.6. Wind Resistance – Thin walled steel tanks are susceptible to sidewall buckling from strong winds if they are not reinforced. One or more horizontal reinforcing rings or vertical girts are required to stiffen the sidewalls. Standards for the design of the stiffening system are contained within the AWWA tank design standards.

7.7. Joints – Joints between wall panels as well as the joint between the bottom panels and the floor shall be made watertight by properly installed caulking and/or a sealing strip containing bentonite. Bolts and nuts shall have a zinc dichromated coating with plastic encapsulated head, or equal protective coating for resistance to corrosion. For bolt specifications, refer to AWWA Standard D103.

7.8. Re-Used Tanks – Only steel tanks specifically designed for nutrient storage and certified by a registered professional engineer are acceptable. The manufacturer should be notified if the tank is to be reassembled or relocated to ensure design loads and erection procedures are consistent with the original design.

SECTION 8 – LIDS AND COVERS

8.1. General Design – Tank lids shall be designed for the loads outlined in the NFBC, OBC and all other applicable codes and standards.

8.2. Ventilation – Where a nutrient storage tank is covered with a lid or floor system that can cause manure gases to accumulate or intensify, a ventilation system shall be installed to eliminate the corrosive gases.

8.2.1. Alternatively, the entire structure shall be designed to accommodate the corrosive nature of manure gases. Where severe exposure to manure gases warrants increased protection:

a. A liner or protective coating shall be used; or

b. A high performance concrete with increased cover over reinforcing steel shall be used in the construction of all components exposed to the gases.

SECTION 9 – QUALITY CONCRETE

9.1. General – The quality of concrete is critical to watertight construction, durability, corrosion resistance and protection for reinforcement. The concrete specified in the design shall be appropriate for the environmental conditions encountered in the nutrient storage structure.

9.2. Concrete Materials – All concrete materials and methods of concrete production and construction shall conform to CSA A23.1. and the concrete producer shall have a valid "Certificate of Ready Mixed Concrete Production Facilities" as issued by the Ready Mixed Concrete Association of Ontario.

9.3. Strength – Concrete used for nutrient storage structures shall have a minimum 28 day compressive strength of:

a. 25 mPa (with a water/cement ratio of 0.55) for plain unreinforced concrete;
b. 30 mPa (with a water/cement ratio of 0.50) for reinforced concrete without freeze/thaw exposure;
c. 32 mPa (with a water/cement ratio of 0.45) for reinforced concrete with freeze/thaw exposure; or
d. 35 mPa (with a water/cement ratio of 0.40) for reinforced concrete exposed to severe manure gases with or without freeze/thaw exposure.

9.4. Air Entrainment – All concrete used for nutrient storage structures shall have air entrainment provided in accordance with CSA A23.1.

9.5. Admixtures – Products for concrete mix enhancement such as high-performance concrete, fly-ash and chemical admixtures may be used to improve the structural design and performance. If chemical admixtures are used they shall meet the requirements of CSA A23.1. The use of water-reducing admixtures is recommended to improve workability and the overall performance of the concrete.

9.6. Sulphate Resistant Concrete – Where concrete is exposed to soils or manure gases with high sulphate contents, Type 50 cement, supplementary cementing materials, or chemical additives suitable for this application shall be used.

9.7. Concrete Cover – Concrete cover guidelines as outlined in CSA A23.1 Table 9 for concrete exposed to earth or weather shall be used for liquid nutrient storage structures unless exposure to severe manure gases warrants an increased level of protection.

SECTION 10 – ACCESSORIES

10.1. Valves and Connections – Manure is naturally corrosive, and all pipes, valves and connections must be resistant to corrosion. Unless otherwise approved by the engineer, use PVC pipe and compatible fittings for all pipes valves and connections. Refer to NSTS-10 for additional information on the standard for transfer piping.

SECTION 11 - RESOURCE INFORMATION

Resource Information Abbreviation used Standards
CSA A23.3 *Design of Concrete Structures*
CSA A23.1 *Concrete Materials and Methods of Concrete Construction*
NBC *National Building Code of Canada* (Parts 3 & 4)
NFBC *National Farm Building Code of Canada*
Underwriters Laboratories of Canada Standard CAN/ULC-S603.1-92, Standard for Galvanic Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids, Second Edition, 1992.
ACI 350 *Environmental Engineering Concrete Structures*
ASAE EP470 *Manure Storage Safety*
ASAE S441 *Safety Signs*
ASCE 7-95 *Minimum Design Loads for Buildings and Other Structures*
ASAE EP393.2 *Manure Storages*
Additional Sources of Information
Midwest Plan Service *TR-9: Circular Concrete Manure Tanks*
Portland Cement Association Bulletin – *Design and Control of Concrete Mixtures – Canadian edition*
Portland Cement Association Bulletin – *Circular Concrete Tanks without Prestressing*
Portland Cement Association Bulletin – *Rectangular Concrete Tanks*
Jofriet, Xhang, Johnson and Bird. 1996. Structural Design of Liquid Manure Tanks. Canadian Agricultural Engineering. Vol 38(l):45-52.
Joffriet, Green and Campbell. 1987. Design Recommendations for Reinforced Concrete Cylindrical Storage Structures for Aqueous Materials. Canadian Journal of Civil Engineering, Vol

14(4):542-549.

Organizations/Associations/Societies
CSA Canadian Standards Association
ASCE American Society of Civil Engineers
ACI American Concrete Institute
ASAE American Society of Agricultural Engineering
PCA Portland Cement Association
NACE National Association of Corrosion Engineers
AWWA American Water Works Association
AISC American Institute of Steel Construction

NSTS-05 STORAGE STRUCTURES FOR SOLID NUTRIENTS

1. PURPOSE AND SCOPE

1.1. Purpose of the Standard – This Standard defines the engineering requirements for the design of structures used for the storage of solid nutrients in agricultural applications. The information required for the structural analysis, design and approval of a solid nutrient storage structure is specified or referenced herein.

1.2. Only structural components, including any liners solid nutrient storage systems must be engineered.

2. DESIGN CRITERIA

2.1. Permanent, solid nutrient storage facilities - are those intended to contain nutrient:

a) with a moisture content of less than or equal to 82% (by volume, wet basis); or

b) meets MOE reg. 347 slump test; and

c) Must be constructed with a concrete floor (minimum thickness of 125 mm); or

d) Category 3 or smaller operations, with a permanent solid nutrient storage on soil must be located on hydrological soils group C or D with a minimum thickness of 0.5 m above the aquifer or bedrock, as determined using soil maps and/or sampling and analysis techniques.

e) Category 4 operations, with a permanent solid nutrient storage on soil must be located on a minimum of 0.5 m layer of *hydraulically secure soil* as determined by a stage 1 geotechnical or hydrogeological investigation as outlined in NSTS - 03.

2.2. Temporary, in-field, solid nutrient storage shall meet the criteria as outlined in OMAF Standard - NSTS-08 *Temporary In-Field Storage*

2.3. Storage Facilities intended to contain nutrient with a moisture content between 70 - 82% by volume, wet basis shall:

a) be located a minimum of 50 m flow path from a surface water; and

b) be equipped with a roof to prevent entry of precipitation; or

c) be equipped with a runoff storage facility with the capacity to contain all runoff emanating from the storage for the full storage period (i.e., following NMAN/MSTOR criteria), or

d) be equipped with a treatment system that meets the specifications in the applicable Ministry protocol.

2.4. Storage Facilities intended to contain nutrient with a moisture content between 50 - 70% (by volume, wet basis) shall:

2.4.1. meet all of the specifications for storage structures in 2.3; or

2.4.2. be located a minimum of 150 m flow path from a surface water; and

a) have a flow path between the storage and the surface water that is not:

i) tile drained;

ii) closer than 0.9 m to bedrock;

iii) closer than 15 m to a well having a continuous well casing extending a minimum of 6 m below the ground surface;

iv) closer than 100 m from a community well or as established by a municipal wellhead protection plan;

v) closer than 30 m from all other wells, and

b) have the following storage geometry:

i) a minimum 1.22 m high containment walls on 3 sides,

ii) a floor constructed to have a neutral (<1%) slope, and

iii) a maximum footprint of the storage is 300 m^2.

2.4.3 Solid Nutrient storage facilities that meet all the criteria outlined in 2.4.2 do not require runoff storage or treatment.

2.5 Storage Facilities intended to contain nutrient with a moisture content of less than 50% by volume, wet basis:

2.5.1 meet all of the specifications for storage structures in 2.3; or

2.5.2 be located a minimum of 50 m flow path from a surface water; and

a) have a flow path between the storage and the surface water that is not:

i) tile drained;

ii) closer than 0.9 m to bedrock;

iii) closer than 15 m to a well having a continuous well casing extending a minimum of 6 m below the ground surface;

iv) closer than 100 m from a community well or as established by a municipal wellhead protection plan;

v) closer than 30 m from all other wells; and

b) have the following storage geometry:

i) shall have minimum 1.22 m high containment walls on 3 sides;

ii) floor is constructed to have a neutral slope (<1%); and

iii) maximum footprint of the storage is 300 m^2.

2.5.3 Solid Nutrient storage facilities that meet all the criteria outlined in 2.5.2 do not require runoff storage or treatment.

3. All concrete shall meet the specification in NSTS-04, Section 9 - Quality Concrete.

NSTS-06 EARTHEN NUTRIENT STORAGE FACILITIES

1. PURPOSE AND SCOPE

1.1.Purpose of the Standard - This Standard defines the engineering requirements for designing earthen nutrient storage structures and provides additional references to assist with the analysis and design.

1.2. Definition - An *earthen nutrient storage facility* is defined as a containment structure built primarily of soil. It includes a compacted soil liner, a synthetic liner or a composite liner.

1.3. Site Suitability - Earthen nutrient storage facilities may be used for the storage of liquid nutrients at sites where the geology, soil and groundwater conditions are suitable. Guidelines for site assessment and site selection can be found in OMAF Standard NSTS-03; *Site Characterization*.

1.4. Definitions –

1.4.1 Compacted clay – for the purpose of protocols NSTS – 06 and NSTS – 07 the term "compacted clay" means; a *hydraulically secure soil* that is compacted to 95% of standard Proctor at the optimum moisture content to meet a maximum saturated hydraulic conductivity of 1×10^{-9} metres per second (as per ASTM D0698).

2. INFORMATION REQUIREMENTS

2.1. Submissions - In conjunction with each design, the Engineer shall submit all information required in OMAF Standard NSTS-01; *Engineering and Inspection* to the appropriate regulatory agency for the evaluation of an application for a new, expanded or modified structure.

3. DESIGN AND CONSTRUCTION

3.1. Design and Construction Requirements - The design and construction of all earthen nutrient storage structures shall take into account the following:

3.1.1. Nutrient storage volume shall be calculated using the most current version of NMAN/MSTOR software or data contained in OMAF's Agricultural Pollution Control Manual.

3.1.2. Freeboard - The storage shall have a minimum freeboard of 0.3 metres. The freeboard is the unfilled capacity between the physical upper elevation of the storage facility (e.g., top of the berms) and its absolute maximum operating level. The level of liquid in the earthen nutrient storage may only rise above the maximum operating level in a contingency situation. The freeboard must be restored as soon as possible.

3.2. Geometric Design:

3.2.1. Inside Wall Slope -The slopes of the inside walls shall be no steeper than 1:2 (rise:run), unless otherwise specified by the engineer and shall be consistent with the requirements of the liner design and pump out equipment.

3.2.2. Exterior Wall Slope - All exterior wall slopes shall be no steeper than 1:3 (rise:run), unless otherwise specified by the engineer and shall be designed to accommodate seeding and maintenance equipment and erosion control.

3.2.3. The minimum top width of embankments shall be no less than 3 metres, unless otherwise specified by the engineer. Greater widths may be required to accommodate tractors, pumps and other equipment. The top of the berm shall be sloped away from the storage to facilitate drainage.

3.3. Earthwork Protection:

3.3.1. Leakage Protection - Installation of an anti-seepage collar shall be provided around piping and penetrations extending through and below the structure. Trenches excavated for the installation of pipes shall be backfilled with compacted soil. A leak proof bond between the fill and native material shall be provided. An anti-seepage collar shall be provided around the pipe section beneath the berm to prevent leakage along the pipe through the berm.

3.3.2. Protection of Slopes - All exterior slopes shall be covered with topsoil and seeded to grass to prevent erosion. Deep-rooted shrubs and trees shall not be permitted on or near the banks of the earthen nutrient storage.

3.3.3. Erosion Control around Inlet Pipes - Protection against scouring and erosion at discharge locations shall be provided. Erosion control pads shall consist of rip-rap on an engineered hydraulic filter, a concrete pad or another erosion control device satisfactory to the design engineer.

3.4. Pumping Access and Agitation Pads - Pads and access ramps shall be designed and constructed to ensure the protection of the floor and side slopes of the earthen nutrient storage facility from erosion, tire rutting or other damage.

3.4.1. Pumping stations shall be spaced to ensure adequate agitation and emptying of the earthen nutrient storage.

3.4.2. The location of the pumping pads shall be well marked.

4. CONSTRUCTION PROCEDURES

4.1. Topsoil Removal -Topsoil shall be stripped to the subsoil layer from the area where any berm is to be constructed and stockpiled for use in the outside slopes of the structure.

4.2. Lift Height - All fill material shall be placed and compacted in 150 mm lifts according to the procedures outlined in subsection 4.3 below.

4.3. Compaction – Soils that form a compacted clay liner must be compacted to at least 95 % of standard Proctor density (ASTM D0698) at the optimum moisture content.

4.4. Berms – All berms must be keyed into existing undisturbed natural ground and compacted to prevent seepage and to maintain satisfactory stability of the embankment.

4.5. Equipment - The compaction equipment for the construction of a compacted clay liner berm or embankment shall be the sheepsfoot roller. Other compaction equipment may be used if the lift depth is less than the depth of protruding teeth or feet.

4.6. Final Surface Treatment – In all cases, the interior surface of an earthen nutrient storage facility shall be disked to a minimum depth of 150 mm and compacted to at least 95 % of standard Proctor density (ASTM D0698) at the optimum moisture content.

4.7. Construction Below Freezing - Excavation and compaction shall be completed only where soil temperatures are above freezing.

5. LINER DESIGN AND CONSTRUCTION

5.1. All earthen nutrient storage facilities for the purpose of containing prescribed liquid nutrients, require the installation of a clay or synthetic liner unless they meet the criteria stated in NSTS – 03 paragraph 2.5. Details on the design and construction of compacted clay and synthetic liners are provided in OMAF Standard NSTS-09; *Synthetic and Natural Liners*.

6. RESOURCE INFORMATION

Resource Information

OMAF Standard NSTS-03 Site Characterization
OMAF Standard NSTS-01 Engineering and Inspection
OMAF Standard NSTS-07 Synthetic and Natural Liners
ASTM D698-00a *Standard Test Method for Laboratory Compaction Characteristics of Soil using Standard Effort*
ASTM - American Society for Testing and Material

NSTS-07a SYNTHETIC LINERS

1. PURPOSE AND SCOPE

1.1. Purpose of the Standard - NSTS-07a; *Synthetic Liners* Standard provides specifications and construction procedures to Engineers for the design and installation of synthetic liners.

1.2. Requirement for a Synthetic Liner – Synthetic liners may be used to line liquid nutrient storage facilities where a liner is required by NSTS-03; *Site Characterization.*

1.3. Definitions:

1.3.1. Geosynthetic clay liners (GCLs) or bentonite mats consist of high swelling, sodium bentonite between two layers of geotextile fabric.

1.3.2. Geomembranes are very low permeability, synthetic membranes used to control fluid migration in a nutrient storage structure. The geomembrane can be polyvinyl chloride (PVC), high density polyethylene (HDPE), or other materials certified as equivalent by the project engineer or the manufacturer.

2. INFORMATION REQUIREMENTS

2.1. The information required for the evaluation of an application for a new, expanded or modified nutrient storage structure is outlined in standards, *NSTS-01; Engineering and Inspection, NSTS-04; Concrete and Steel Nutrient Storage Structures, NSTS-05; Storage Structures for Solid Nutrients, and NSTS-06; Earthen Nutrient Storage Facilities.*

3. GEOSYNTHETIC CLAY LINERS:

3.1. Design Criteria:

3.1.1. Permeability - Geosynthetic clay liners used to control seepage from a nutrient storage facility shall have a final maximum saturated hydraulic conductivity of 1×10^{-9} metres/second.

3.1.2. Handling, installation, maintenance and repair must be according to the manufacturer's recommendations.

4. GEOMEMBRANE LINERS

4.1. Design Criteria - The design of the geomembrane liner shall take into account the following:

4.1.1. Liner Thickness - A minimum liner thickness of 30 Mil (non-reinforced) shall be used where subgrade can be smoothed as outlined in Section 6.

4.1.1.1. Wherever the subgrade cannot be prepared as outlined in Section 6, a liner thickness greater than 30 Mil of reinforced geomembrane or bedding material such as sand or geotextile cloth is required.

4.1.2. The manufacturer's design specifications for thermal expansion shall be followed.

4.2. Shipping, Handling and Storage - Geomembrane Liners shall be shipped, handled and stored so that damage to the liner is prevented according to the manufacturer's recommendations.

4.3. Installation Procedures - The geomembrane liner shall be installed in the nutrient storage structure according to the manufacturer's recommendations.

4.4. Field Seams and Testing

4.4.1. Factory or fabricated pipe collars shall be used to seal all pipe penetrations.

4.4.2. Seams shall be made by approved solvent welding or double heat fusion wedge welding.

4.4.3. All liner seams shall be subject to nondestructive field testing

4.4.3.1. PVC seams shall be tested using the air lance method or the air channel test where a double sedge welded seam had been used following ASTM D4437.

4.4.3.2.HDPE seams shall be tested using the vacuum test method or air channel test method following ASTM D4437.

4.4.3.3. Other liner types shall be tested following methods approved by the Director.

5. SUBGRADE PREPARATION FOR SYNTHETIC LINERS

5.1. Subgrade Preparation:

5.1.1. The subgrade surface shall be firm, unyielding and free of voids and cracks.

5.1.2. The subgrade surface shall be machine smoothed to ensure that no protrusions greater than 12 mm, ruts, abrupt , unplanned grade change or voids exist within the subgrade.

5.1.3. The slopes and base of the nutrient storage shall be compacted to at least 95 % of maximum standard proctor density (ASTM D698) at the specified moisture content.

5.1.4. The liner shall not be constructed below the seasonal high water table or saturated conditions unless the Engineer can show that the drainage or ballasting system will counteract any potential blow out or other form of deformation or deterioration of the liner or building due to hydraulic pressure.

5.1.5. OMAF Standard NSTS-03; *Siting Characteristics* establishes the minimum distance from the bottom of the nutrient storage structure to the unconfined aquifer or bedrock

5.1.6. If there is a possibility of gas formation under the liner, an appropriate venting system shall be designed and installed.

6. ANCHORING SYNTHETIC LINERS

6.1. The liner shall be anchored or bonded to the structure and/or subgrade and/or earthen berms according to good engineering practices or to the manufacturer's specification.

6.2. Where cover materials are used to anchor the synthetic liner they shall be carefully placed over the liner to prevent damage to the liner.

7. PROTECTIVE COVER FOR SYNTHETIC LINERS

7.1. Placement of the Liner Cover - The liner must be protected from environmental or mechanical damage including livestock or wildlife trampling.

7.2. On sloped sidewalls, a minimum cover of 300 mm shall be placed on all areas. In areas where traffic may occur and around pumping pads and pipe inlets, a minimum cover of 600 mm is required.

8. INSTALLATION OF OTHER STRUCTURES

8.1. Installation of accessory structures – Where accessory structures (e.g.,erosion pads, agitator pads, access ramps, concrete, riprap, or geogrid) are installed on a soil cover material over a synthetic liner they shall be installed without intrusion into the soil cover material.

8.2. Bonding to accessory structures – Where an accessory structure (e.g., erosion control pads, access ramps, agitator pads etc.) creates a discontinuity in the synthetic liner, the liner must be bonded to that structure using a method satisfactory to the manufacturer or the project engineer.

8.3. On sloped sidewalls, all concrete ramps or pads shall be designed with sufficient anchorage at the top of the berm to prevent any sliding.

9. MAINTENANCE AND REPAIR OF SYNTHETIC LINERS

9.1. Inspection prior to filling or covering – A synthetic liner must be inspected to ensure that there are no damage or perforations within the synthetic liner and any damage or perforations discovered during inspection must be repaired prior to filling of the structure or covering of the liner.

9.2. Damaged Areas - Damaged areas identified during construction or routine inspection shall be repaired according to the manufacturer's or engineer's specifications.

9.3. The project Engineer shall inspect all repairs and either approve the repairs or require additional protection such as erosion protection at inlet pipes, transfer lines, or agitator pads and protection from wheel damage.

9.4. The owner shall undertake routine observations of the liner condition. Problem areas shall be repaired as soon as possible, according to the manufacturer's specifications.

9.5. An engineering assessment is required where the damage is such that it cannot be repaired according to the manufacturer's specifications or where the damage is associated with a bond between the liner and an accessory structure.

10. REFERENCES

OMAF Standard NSTS-01; *Engineering and Inspection*
OMAF Standard NSTS-03; *Site Characterization*
OMAF Standard NSTS-06; *Earthen Nutrient Storage Structures*

National Farm Building Code of Canada

ASTM D698 Test Methods for Laboratory Compaction Characteristics of Soil using Standard Effort

ASTM D4437 Standard Practice for Determining the Integrity of Field Seams used in Joining Polymeric Membranes

NSTS-07b Compacted Clay Liners

SECTION 1- PURPOSE AND SCOPE

1.1. Purpose of the Standard –This protocol provides specifications and construction procedures to Engineers for the design of compacted clay liners.
1.2. Requirement for a Compacted Clay Liner - Compacted Clay Liners may be used to line liquid nutrient storage facilities where a liner is required by NSTS-03; *Site Characterization.*
1.3. Definition of a Compacted Clay Liner - A compacted clay liner is a seepage barrier constructed of a cohesive soil that is compacted to increase its dry bulk density, homogeneity, reduce porosity and decrease soil permeability. Within the earthen nutrient storage structure, the compacted clay liner is

designed to impede seepage of the liquid nutrient into the subsurface below or adjacent to the structure.

1. 4 Scope of the Standard - For a compacted clay liner to function properly, it must be designed and constructed according to strict engineering standards and specifications. This standard describes the design criteria, methods of construction, and quality assurance and control procedures required for the acceptable construction of these liners.

1.5 Definitions –

1.5.1 Compacted clay – for the purpose of protocols NSTS – 06 and NSTS – 07 the term "compacted clay" means; a *hydraulically secure soil* that is compacted to 95% of standard Proctor at the optimum moisture content to meet a maximum saturated hydraulic conductivity of 1 x 10^{-9} metres per second (as per ASTM D0698).

SECTION 2 - MATERIAL SUITABILITY

2.1. The qualified professional shall be responsible to ensure that the required tests are carried out to accurately characterize the material used to construct the compacted clay liner.

2.2. Laboratories - Only laboratories approved by the regulatory authority shall be used to analyze materials to be used in the construction of compacted clay liners for particle size distribution, Atterberg limits and hydraulic conductivity.

2.2.1. All materials to be used in the construction of a compacted clay liner shall be analyzed for particle size distribution following ASTM D2487-00 and Atterberg Limits following ASTM D4318-00 or any other method approved by the Director.

SECTION 3 - MATERIALS AND TESTING

3.1. If the distribution of the particle size classes and the Atterberg limits fall within the acceptable ranges given in Subsection 3.1.1. and 3.1.2, the material is considered acceptable for compacted clay liner construction without the need for additional laboratory testing providing it is installed using the recommended methods and equipment as described in Sections 4 and 5. The use of acceptable materials (as defined above) with the appropriate construction methodologies and equipment are expected to produce compacted clay liners with hydraulic conductivities of 1 x 10^{-9} metres/second or less.

3.1.1. Acceptable Particle Size Ranges (by weight):
- Percent Fines ; = 50 %;
- Clay Content ; = 20 %;
- Sand Content ; = 45 %;
- Gravel Content; = 50%; and

3.1.2. Acceptable Atterberg Limits:.
- Plasticity Index (PI): 20% = PI ≤ 30 %.
- Liquid Limit (LL): 30% = LL ≤ 60 %

3.2 Where the materials used to construct the compacted clay liner do not meet the specifications set out in subsections 3.1.1 and 3.1.2 the materials must be laboratory tested and a liner design and construction method specified to ensure that the liner will meet a final maximum saturated hydraulic conductivity of 1 x 10^{-9} metres per second.

3.3. Required Testing for All Materials -The Engineer must complete a standard Proctor density test following ASTM 0698 to determine the maximum dry unit weight and optimum soil moisture content.

3.4. In situ testing – Moisture and density tests must be performed on the liner during and after construction to ensure that the liner meets the required design specifications.

SECTION 4 -CONSTRUCTION EQUIPMENT

4.1. Recommended Equipment -The recommended compaction equipment for the construction of a compacted clay liner is the Sheepsfoot Roller Compactor. Rollers meeting the following criteria shall be considered acceptable:

4.1.1. Soil Contact Pressures - The compaction equipment or rollers shall be ballasted to attain soil contact pressures of at least 2400 kPa.

4.1.2. Tamping Feet Requirement -The tamping feet shall be 200 mm to 250 mm in length from the cylindrical surface of the roller. The tamping feet shall have a face area between 4500 and 6000 mm^2 . The compactor feet shall be spaced to provide at least 4 tamping feet for each 0.25 m^2 of cylindrical surface.

4.1.3. When a Sheepsfoot Roller Compactor is not available, other compaction equipment may be used, subject to approval of the Director.

SECTION 5 - COMPACTED CLAY LINER CONSTRUCTION

5.1 The minimum thickness of the completed compacted clay liner shall be 1.0 m

5.2 The inside side slopes of the earthen nutrient storage structure shall be no steeper than 1:2 (rise:run). The Engineer may recommend flatter slopes or specify the use of procedures or equipment to ensure proper compaction of the liner.

5.3. To allow proper sealing between lifts, the interface surface of lower lifts shall be properly disked or scarified, before placement of subsequent lifts of material.

5.4. The clay liner shall be compacted at least 95% of standard Proctor maximum dry density as determined for this soil at a specified optimum water content.

5.5. All rocks and stones of significant size, roots and other organic debris shall to be removed from liner material prior the compaction.

5.6. Excavation and compaction shall be completed during soil temperatures that are above freezing.

5.7. Each compacted lift shall be protected from drying out to prevent cracking due to shrinkage.

5.8. The overlap between equipment passes shall not be less than 10 % of the width of the equipment being used to ensure lateral bonding between placed materials.

SECTION 6 - RESOURCE INFORMATION

OMAF Standard NSTS-01; *Engineering and Inspection*
OMAF Standard NSTS-03; *Site Characterization*
OMAF Standard NSTS-06; *Earthen Nutrient Storage Structures*
National Farm Building Code of Canada
ASTM D698-00a *Standard Test Method for Laboratory Compaction Characteristics of Soil using Standard Effort*

ASTM D2487-00 *Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)*

ASTM D4318-00 *Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils*

NSTS-08 TEMPORARY IN-FIELD STORAGE OF PRESCRIBED NUTRIENTS

1. No person shall store liquid nutrients in a temporary, in-field nutrient storage site.

2. The location of a temporary, in-field nutrient storage site shall satisfy the following requirements:
   (a) the minimum depth of unconsolidated soil to bedrock shall be 1.5 metres;
   (b) the minimum depth of unsaturated soil shall be 0.9 metres permanent water table;
   (c) nutrient with more than 70% moisture content shall not be stored on soils that have rapid infiltration rates (Hydrological Soil Group A) as defined by soil hydrologic group in the Drainage Guide (Ministry of Agriculture and Food Publication 29); and
   (d) it shall not,
      (i) be located in the regional or 1 in 100 year flood zone; or
      (ii) have a slope greater than 3%.

3. Temporary in-field nutrient storage sites shall be managed in accordance with the following criteria:

   (a) except as provided for in section 7, a farmer receiving nutrients and storing them in a temporary in-field nutrient storage site on a farm unit can not receive and store a volume of nutrients that is greater than the quantity of nutrients that the farmer plans to use for crop production at that farm unit based on a compliant nutrient management plan;
   (b) non-agricultural source material stored in a site must be used at the farm unit where it is stored and can not be transferred to another farm unit;
   (c) if more than one type of nutrient is stored at a site the nutrients shall be managed in accordance with the most restrictive requirements applicable to any of the nutrients on the site;
   (d) where the site is located on a slope it shall be located near the top of the slope to minimize the exposure of the nutrients to up-slope runoff or the site shall be equipped with runoff diversion structures;
   (e) where a temporary nutrient in-field storage is located within a 150 m long flow path from surface water a vegetated buffer strip at least 3 metres wide is required between the site and the surface water;
   (f) if the site is located in an area that is tile-drained the field tiles shall be the site shall
      i) be pre-tilled or the tiles shall be monitored on a weekly basis for indicator colour and odour; and
      ii) a contingency plan to plug or reroute the tile drains must be in place and acted upon.
   (g) nutrients shall not be stored at a site for longer than the maximum time prescribed for each nutrient; and
   (h) the site may be used again in the following year if:
      i) the site is cultivated after the nutrients are spread on the land or removed from the site; and
      ii) a vegetative cover has been established during the growing period following the removal of the nutrients from the site; and
      iii) the soil phosphorus levels are maintained below 101 parts per million (sodium bicarbonate extractable).

4. No person shall locate a temporary, in-field nutrient storage site:

(a) within 45 metres of a well that has a continuous steel casing that extends at least 6 metres below the surface of the ground;
(b) within 90 metres of any other well;
(c) with less than a 90 metre flow path to surface water;
(d) within 200 metres of a single residence if the site contains de-watered municipal sewage biosolids;
(e) within 125 metres of a single residence if the site contains prescribed materials other than de-watered municipal sewage biosolids;
(f) within 450 metres of a residential area if the site contains de-watered municipal sewage biosolids; or
(g) within 250 metres of a residential area if the site contains prescribed material other than de-watered municipal sewage biosolids.

5. Subject to section 7 no person shall store nutrients in a temporary in-field nutrient storage site for longer than the following periods:

a) De-watered municipal sewage biosolids may be stored for a maximum of 10 days;
b) Prescribed material which is left uncovered may be stored for a maximum of 60 days with the exception of municipal sewage biosolids and manure stored in accordance with clause c.
c) Manure may be stored uncovered for 120 days if it is stored in a pile with a maximum height of 3 meters and a maximum width of 6 meters and it is turned, so that every piece of material in the pile is displaced from its former position and mixed or inverted, every;
   i) 15 days if the moisture content of the manure is greater than 70 percent;
   ii) 30 days if the moisture content of the manure is greater than 50 percent and not more than 70 percent; or
   iii) 60 days if the moisture content of the manure is not more than 50 percent;
d) Prescribed material that is covered, with the exception of municipal sewage biosolids, may be stored for 120 days.

6. The operator shall maintain records for all temporary in-field nutrient storage sites under the operator's control including;

a) the date the site was established;
b) the date or dates the pile was displaced and mixed or inverted, if applicable,
c) the date the pile was removed; and
d) a sketch indicating the location of the site relative to surface waters and other temporary in-field storage sites

7. The Director may authorize a person to increase the storage period or the amount of prescribed material which may be received at a temporary in-field nutrient storage site if he or she is satisfied that the person is meeting the Ministry of the Environment Interim Guidelines for the Production and Use of Aerobic Compost in Ontario or the Ministry of Agriculture and Food Protocol for On-Farm Composting.

NSTS-09 SEEPAGE MONITORING, LEAKAGE DETECTION and MANAGEMENT

1. **PURPOSE AND SCOPE** - this standard must be applied to storage facilities containing all prescribed nutrient materials situated within a two-year water capture zone.

2. The owner or operator of a new or expanding agricultural operation that is located within the two-year water capture zone of a well that supplies water to a municipal water system that includes a permanent liquid nutrient storage facility shall ensure that monitoring of groundwater movement under the facility is carried out in accordance with sections 4 to 12 of this protocol.

3. For all category 4 agricultural operations a professional engineer shall carry out the installation and monitoring of the monitoring system and samples shall be submitted to an approved laboratory for analysis whenever they are collected.

4. An internal monitoring system for groundwater movement shall be comprised of a water leachate collection and monitoring system located between the 1st and 2nd protective layers of the facility that is composed of granular material that is capable of capturing any leakage that may occur from the permanent liquid nutrient storage facility.

5. For the purposes of section 4., a protective layer includes a synthetic liner, a natural liner, concrete, or hydraulically secure soil.

6. (1) For all category 1 to 3 agricultural operations, a qualified person shall carry out installation of the internal monitoring system for groundwater movement.

(2) The owner of the storage facility or a person designated by the owner shall monitor the system and take samples of any liquid that is found in the monitoring system and the owner is responsible for submitting the samples to an approved laboratory for analysis when they are taken.

7. The samples shall be tested for ammonium and chlorides.

8. If ammonium or chlorides are found in the sample at levels which are 10 times greater than the levels established by monitoring background levels,

(a) all liquid in a tile drain monitoring system shall be pumped into the permanent liquid nutrient storage facility or into an approved treatment system; and

(b) the monitoring system shall be monitored on a weekly basis and any liquid found shall be tested until ammonium or chlorides are less that 10 times greater than the levels established by monitoring background levels.

9. If ammonium or chlorides levels are not greater than 10 times the background levels in the weekly samples or if adequate volumes are not present for sampling, the sampling and testing shall be carried out on a bi-weekly basis, reduced to a bi-monthly basis after 4 tests and further reduced to 2 times per year after 5 years of operation.

10. (1) An accredited laboratory shall analyze samples taken from a monitoring system.
(2) The results of the analysis shall be reported to the owner or operator of the farm unit.

11. The owner or operator of the farm unit shall notify the Ministry of the Environment by speaking with a person at the Ministry's Spills Action Centre if the amount of leakage exceeds predicted levels for a new facility as specified by the designer.

12. The owner or operator of the farm unit shall ensure that a record of the leakage monitoring results is kept at the business office of the farm unit.

NSTS-10 TRANSFER SYSTEMS FOR LIQUID NUTRIENTS

SECTION 1 - PURPOSE AND SCOPE

1.1. Purpose of the Standard – This Standard defines the requirements for the design of permanent transfer systems within or associated with liquid nutrient storage structures.

1.2. Objective – The objective of this protocol is to establish a minimum standard for the design, materials, construction, and installation of liquid nutrient transfer systems.

1.3. No person shall transfer liquid nutrients from place to place on a farm unit by means of a liquid nutrient transfer system unless the system has been designed and constructed and is operated in accordance with this protocol.

1.4. A nutrient transfer system that has been constructed in accordance with this protocol does not require monitoring for groundwater movement.

SECTION 2 - EQUIVALENTS

2.1. General - The provisions in this protocol are not intended to limit the appropriate use of materials, systems, equipment, and procedures not specifically described herein.

2.2. Alternatives – Alternatives not specifically described herein, or which may vary from specific requirements of this protocol, or for which no specified test procedure has been established, are permitted to be used:

c. If it can be shown that these alternatives are based on sound engineering principles and are equivalent on the basis of tests, evaluation or past performance; and

d. If the authority having jurisdiction is satisfied that these alternatives provide a level of public and environmental protection that is equivalent to the performance required by this protocol.

SECTION 3 – GRAVITY FLOW PIPING SYSTEMS

3.1. General – The size of the transfer pipe shall be adequate to develop sufficient flow velocity to transport the solids. Generally, no pipe smaller than 200 mm diameter shall be used for gravity flow systems.

3.2. Pipe Strength – The pipe must be able to withstand all loading conditions it is likely to be exposed. This shall include:

a. Internal pressure due to surcharge or head pressure from liquids stored in the tank;

b. External earth loads, superimposed live loads, and the supporting strength of the pipe under various types of installations and bedding conditions; and

c. Frost loads.

3.3.Pipe Materials – The pipe used in gravity flow systems shall be gasketed PVC (Polyvinyl Chloride) pipe certified to CSA B182.2 and conforming to ASTM D3034.

3.3.1. Alternative corrosion resistant pipe materials are acceptable if they have been manufactured in

conformity with the latest acceptable standards issued by the Canadian Standards Association, the American Society for testing materials, or other recognized standards writing organization.

3.4. Fittings – Only purpose made gasketed fittings such as "Tees", "Saddles", "End caps" and "Elbows", congruent with the pipe material, shall be used for pipe connections. Rough sawn holes, sealed with concrete are not acceptable.

3.5. Pipe Venting – Adequate pipe venting shall be installed to ensure the transfer piping system operates effectively. Pipe vents to the exterior shall extend 2 m above grade level with a protected opening.

3.6. Cleanouts – Cleanouts, allowing access from one direction shall be installed in the upstream end of all liquid nutrient transfer pipes. The spacing of cleanouts shall not exceed 90 m and shall be installed in a manner to facilitate removal of blockages.

3.7. Tank Connections - Where the pipe enters or leaves a storage tank, a flexible watertight gasket or membrane should be installed between the pipe material and the floor or wall of the storage tank to serve as an anti-seepage collar.

3.8. Floor Drains – Floor drains in buildings that connect to a liquid nutrient storage structure shall be installed in a manner that prevents manure gases from adversely affecting or accumulating in the adjoining building.

3.8.1. Except as noted in Sentence (2.4.2.), floor drains that lead from any building into a liquid manure storage structure shall be equipped with a trap and venting system constructed in accordance with the Ontario Building Code.

3.8.2. A trap is not required where an alternate system of ventilation has been designed to prevent manure gases from adversely affecting or accumulating in the adjoining building.

SECTION 4 – FORCEMAIN PIPING SYSTEMS

4.1. General – Forcemain systems shall be utilized where the pipe pressure exceeds an equivalent liquid head of 3.5 m.

4.2. Sizing – The size of the transfer pipe shall be adequate to develop a flow velocity of 0.8 to 2.5 m/s for the pump used. Generally, no pipe smaller than 100 mm diameter shall be used for forcemain systems.

4.3. Pipe Strength – The pipe must be able to withstand all loading conditions it is likely to be exposed. This shall include:

a. Internal operating pressure due to surcharge or head pressure from the pump;

b. Transient pressures or water hammer shock caused by rapid valve operation and pump start-up and shut-down;

c. External earth loads, superimposed loads, and the supporting strength of the pipe under various types of installations and bedding conditions; and

d. Frost loads.

4.4.Pipe Materials – The pipe used in forcemain systems shall be gasketed PVC (Polyvinyl Chloride) pipe certified to CSA B137.3 and conforming to AWWA C905 standard.

4.4.1. Alternative corrosion resistant pipe materials are acceptable if they have been manufactured in conformity with the latest acceptable standards issued by the Canadian Standards Association, the American Society for testing materials, or other recognized standards writing organization.

4.4.2. All exposed piping and fittings for liquid nutrient transfer piping is to be treated with a surface applied UV inhibitor as recommended by the manufacturer.

4.5. Fittings – Only purpose made gasketed fittings such as "Tees", "Saddles", "End Caps" and "Elbows", congruent with the pipe material, shall be used for pipe connections.

4.6. Tank Connections - Where the pipe enters or leaves a storage tank, a flexible watertight gasket or membrane should be installed between the pipe material and the floor or wall of the storage tank to serve as an anti-seepage collar.

4.7. Emergency Shut-Off - A primary shut-off valve is required in the transfer pipe where there is an opportunity for backflow to the pump or pump-out chamber. An emergency valve or secondary shut-off is to be installed adjacent to the primary valve. The emergency shut-off shall be easily accessible and failsafe.

4.8. Thrust Blocks – Adequate restraint shall be provided to prevent pipe movement and joint failure by thrust blocks positioned at all plugs, caps, tees, reducers, wyes, and bends greater than 22.5 degrees. Thrust blocks are to be constructed in accordance with OPSS 1103.020 standards with a minimum concrete mass of 0.03 cubic meters.

SECTION 5 - PIPE INSTALLATION

5.1. Assembly – Proper assembly will involve the following:

a. CLEAN: Before starting assembly, make certain that the factory installed gasket, bell recess and beveled spigot end are free of all dirt.

b. LUBRICATE: Apply approved lubricant to the surface of the spigot end up to the stop mark, including the tapered end of the spigot. Also apply lubricant on the full circumference of the gasket.

c. ASSEMBLE: Lay out the pipe with the bell end of the pipe upgrade. Align the spigot to the bell and insert the spigot into the bell as far as the stop mark, either by hand or with a bar and block. Insert until the stop mark is adjacent to, but not covered by the pipe bell.

d. CHECK: All gasket joints must be checked, at intervals around the pipe, with a feeler gauge to ensure that the gasket has not been displaced during assembly. If the gasket is not in position, disassemble the joint, reassemble and check again.

e. ALIGNMENT: Joints are not designed to allow for substantial deflection of the pipe. Proper fittings or bends must be installed to change pipe direction.

5.2. Handling – The following care shall be taken with the unloading and handling to prevent damage to pipe:

a. Inspect all material for damage from transit or handling before assembly.

b. Store pipe at site, according to manufacturer's instructions.

5.3. Trench Preparation - The trench bottom must be excavated as close as possible to the required grade. Where the trench is dug to below grade, material should be added and compacted, to restore the proper grade. Added material should be compacted to a density similar to undisturbed material.

5.4. Backfill – The backfill shall be installed in accordance with the limitations and guidelines of the pipe manufacturer.

a.) Material used for backfilling should be free of stones, frozen lumps or other deleterious materials that might damage the pipe. Selected native material when suitable is usually used as backfill. Imported material may be used if the native material is not suitable.

b.) Care should also be taken to ensure that the placing of the backfill does not shift the pipe in a horizontal or vertical direction. The backfill should provide even support along the entire length of the pipe.

5.5. Crossing Under Roadways - If a liquid nutrient pipe must cross under a roadway, there should be adequate backfill cover depth to ensure road loads are properly distributed to avoid crushing the pipe. Check with the manufacturer regarding the required cover depth for the specific pipe size.

5.5.1. Frost penetration and pipe freezing under roadways may also be a concern. Ideally there should be at least 1.2 m of cover over the pipe. However, frost penetration is typically deeper under cleared roadways, the placement of an insulating material over the pipe might be required.

5.6. Backflow Protection - In situations where the liquid nutrient storage structure is located at a higher elevation than the barn, an adequate backflow check valve should be incorporated into the transfer system. This will prevent manure from flowing back into the barn should the pump malfunction.

5.7. Safety – All work shall be carried out in accordance with the Ministry of Labour – Construction Health and Safety Standards.

SECTION 6 - QUALITY ASSURANCE FOR PIPING SYSTEMS

6.1. Deflection Testing – The maximum allowable pipe deflection in PVC piping is 7.5%.

6.2. Construction Review - The project engineer shall review the integrity of the complete liquid nutrient transfer piping system during and immediately following completion of the construction. The review shall be performed on a rational sampling of the work completed prior to backfill.

SECTION 7 - FLOOR TRANSFER SYSTEMS

7.1 All floors used for the transfer of liquid manure shall be constructed with concrete.

7.2 All floor transfer systems shall be capable of containing the liquids and transferring them to a storage structure as defined in the applicable protocol.

7.3 Livestock housing areas within a barn that are not intended to collect liquid manure are not deemed to be a liquid transfer system. These include areas under dairy free-stalls, feed trough areas and floors under solid manure pack areas.

SECTION 8 - REFERENCES

Ontario Provincial Standard Specification 410 (OPSS 410), April 1999.

Ontario Building Code

National Farm Building Code of Canada

ASTM D3034

American Water Works Association - AWWA C905

Canadian Standards Association – CSA B182.2, and CSA B137.3

NSTS-11 DECOMMISSIONING OF STORAGE STRUCTURES CONTAINING NUTRIENTS

SECTION 1 - PURPOSE AND SCOPE

1.1 Purpose – The purpose of this standard is to outline the requirements for decommissioning a nutrient storage structure.

1.2 Scope – This standard applies to all new and existing nutrient storage structures.

SECTION 2 – GENERAL REQUIREMENTS

2.1 It is the owner's responsibility to maintain all nutrient storage facilities in a state of good repair whether they are utilized or not.

2.2 The owner or operator of a permanent nutrient storage structure shall ensure that it is properly decommissioned if:

a.) The structure will no longer be required for the storage of nutrients; or

b.) The structure is temporarily taken out of service

SECTION 3 – **TEMPORARY DECOMMISSIONING**

3. (1) A person who is temporarily decommissioning a permanent nutrient storage facility shall:

a.) remove the contents of the storage facility or maintain the contents in a manner that does not jeopardize the safe operation of the structure for future use;

b.) maintain a minimum of 0.3 m freeboard at all times; and

c.) maintain the facility in a good state of repair and safe working condition.

(2) A person who has temporarily decommissioned a permanent nutrient storage facility shall,

a.) inspect the facility periodically and not less frequently than once a year to ensure that it doesn't present a hazard to people or the natural environment; and

b.) have the facility inspected and evaluated by a professional engineer at 10 year intervals in accordance with NSTS-12

SECTION 4 – **PERMANENT DECOMMISSIONING**

4.1 (1) A person who is permanently decommissioning a permanent nutrient storage facility shall,

a) remove all remaining nutrient from the facility;
b) pressure wash the walls and floors of the facility to remove any nutrient left on those surfaces if the facility is made out of concrete or steel; and
c) dispose of the remaining nutrient and wash water in accordance with a compliant nutrient management plan;

(2) If the facility is made out of concrete or steel the person shall,

a.) collapse the walls of the structure onto the floor if the structure is located below grade; or
b.) manage or dispose of the steel and concrete components of the structure in accordance with provincial law.

(3) If the facility is made out of earth the person shall,

a.) remove any earth that is contaminated by nutrients and dispose of it in accordance with a compliant nutrient management plan; and
b.) push any berms made of earth into the cavity.

(4) In the case of either subsection (2) or (3) the person shall complete the decommissioning of the facility by,

a.) filling the cavity with clean soil or other fill material that has the same permeability as the surrounding soil;
b.) mounding the fill above the original grade to allow for settling of the fill;
c.) top-dressing the site with 150 millimetres of top soil; and
d.) establishing vegetation on the site.

4.2 No person shall allow water to accumulate on the site of a permanently decommissioned permanent nutrient storage facility

NSTS-12 EXISTING OPERATIONS

This standard is intended to outline the evaluation process required for existing nutrient storage facilities.

Facilities:

1. (1). Subject to subsection (2) owners and operators of existing agricultural operations that generate nutrients shall carry out a comprehensive evaluation of the permanent nutrient storage facilities located on their operations within the following time limits:

(a) Category 4 - on or before March 31, 2004;
(b) Category 2 and 3 – on or before March 31, 2005;
(c) Category 1 – on or before March 31, 2008.

(2). Where the owner or operator built a permanent nutrient storage facility in accordance with the standards contained in the "Agricultural Pollution Control Manual" between April 1, 1994 and March 31, 2003, the owner or operator shall have a comprehensive evaluation of the facility carried out by a professional engineer within 10 years of the date the building permit for the facility was issued or the date as determined by subsection (1), whichever is the later.

2. (1) Subject to subsection (2) owners and operators of agricultural operations that receive nutrients but do not generate nutrients shall have their permanent nutrient storage facilities evaluated by a professional engineer within the following time limits:

(a) Category 4 - on or before March 31, 2004;
(b) Category 2 and 3 – on or before March 31, 2005; and
(c) Category 1 – on or before March 31, 2008.

(2) Where the owner or operator built a permanent nutrient storage facility in accordance with the standards contained in the "Agricultural Pollution Control Manual" between April 1, 1994 and March 31, 2003, the owner or operator shall have a comprehensive evaluation of the facility carried out by a professional engineer within 10 years of the date the building permit for the facility was issued or the date as determined by subsection (1), whichever is the later.

3. Within the time periods specified in sections 1 and 2 all owners and operators of existing agricultural operations shall ensure that their permanent nutrient storage facilities are capable of containing at least all of the nutrient produced on or received at the operation during a period of 240 days with the following exceptions:

(a) a farmer who sends some of the nutrient generated on the farmer's agricultural operation to a broker and that broker require an aggregate storage capacity of 240 days between them;
(b) where the period of use of a permanent livestock confinement area is less than 240 days the storage capacity of the permanent nutrient storage facility associated with the area must be adequate for the period of confinement; or
(c) where the nutrient management plan allows for a lesser period of time to be required for storage then the storage will meet the requirements of the plan

4. For the purposes of sections 1 and 2 an owner or operator of,

(a) any agricultural operation must demonstrate on the basis of reliable information that each permanent liquid nutrient storage facility located on the owner's or operator's agricultural operation; and

(b) a category 4 agricultural operation that stores solid nutrient on the operation in a facility that does not have a concrete floor must demonstrate on the basis of reliable information that each permanent solid nutrient storage facility located on the owner's or operator's agricultural operation,

is not having an adverse effect on surface or groundwater resources including,

(i) ensuring that there is no evidence of significant leakage into perimeter drains around the facility; and

(ii) determining the need for an observation station.

5. For the purposes of section 4 "reliable information" includes,

(a) a report based on an investigation conducted by a professional engineer that takes into consideration the topographic, geologic and hydrogeologic features of the agricultural operation in relation to the siting and operation of its permanent nutrient storage facilities; or
(b) a peer-reviewed Environmental Farm Plan prepared by or on behalf of the owner or operator of the agricultural operation that has been evaluated from time to time in accordance with the requirements of the plan.

6. No person shall construct or enlarge an operation that generates or stores non-agricultural prescribed materials unless the new or expanded operation has a permanent nutrient storage facility or facilities that is or are capable of containing at least all of the nutrient produced on or received at the operation during a period of 240 days.

7. Owners or operators of existing operations that generate or store non-agricultural prescribed materials shall manage such materials in accordance with their nutrient management strategy.

8. If an existing permanent nutrient storage facility does not meet the setback requirements of this regulation the owner or operator of the facility shall provide documentation in the owner's or operator's nutrient management plan that indicates the shortfall between the set back of the existing facility and the setback requirements of this regulation.

9. To determine with reasonable proof that the storage structure is operated and maintained in an acceptable manner consistent with the intent of the original design, the following checks must be made:

a.) surface water is directed away from the structure and prevented from ponding adjacent to the building, and controlled in a manner that prevents spills from adversely effecting surface and groundwater.

b.) the volume of storage is in accordance with the requirements of the Nutrient Management Plan.

c.) provisions for loading, agitation, and emptying have been made and the construction of the storage structure is in conformity with the equipment used for these purposes.

d.) the ventilation system has sufficient capacity to prevent the accumulation of corrosive gases.

e.) transfer piping is vented in conformance with NSTS-10.

f.) transfer piping has secondary shut-off valves in conformance with NSTS-10.

g.) safety fences are installed in accordance with NFBC Section 4.1.1.4.

h.) signage is installed clearly describing the risk of manure gases in accordance with NFBC Section 4.2.4.1.

10. Additional investigation or testing shall be performed where potential problems were identified in the evaluation and a thorough examination is required to resolve a solution.

11. Notification – If the engineer cannot demonstrate with reasonable proof that the items listed in section 9 meet an acceptable level of performance:

a. the engineer shall notify the authority having jurisdiction; and

b. the owner shall perform the necessary repairs or decommission the storage structure.

Nutrient Management Protocols
For
Ontario Regulations
Made under the
Nutrient Management Act, 2002

Biosecurity Protocol

Draft for Discussion Purposes Only

November, 2002

TABLE OF CONTENTS

1 PURPOSE

The intent of this protocol is to address the biosecurity concerns of agriculture producers with respect to farm visits by OMAF and MOE personnel. The protocol will apply to all situations involving OMAF and MOE staff entering agricultural operations, not just those pertaining to the Nutrient Management Act. This protocol may also serve as a guideline for other Ontario government ministries.

This is meant as a minimum standard for government staff. The measures outlined in the protocol are designed to minimize the risk of transferring hazards between agricultural operations under normal conditions. Additional measures may be required in certain situations or upon request by the agricultural operator. If additional measures are requested by the agricultural owner/operator, adequate and appropriate equipment and facilities are to be provided by the agricultural owner/operator.

Complete biosecurity is still the responsibility of the owner/operator of the agricultural operation.

Biosecurity concerns cannot be used as a means to restrict entry of government staff to agricultural operations.

2 MINIMUM REQUIRED EQUIPMENT

2.1 *PERSONAL EQUIPMENT*

Disposable booties or washable rubber boots
Germicidal hand lotion and hand wipes
Launderable or disposable coveralls or labcoat*

2.2 *VEHICLE EQUIPMENT*

Pail and boot brush for washing boots and equipment
Broad spectrum bactericidal and viricidal disinfectant
Jug of water (5L is sufficient)
Garbage bags for storing contaminated clothing and equipment
Disposable booties and gloves
Paper towels

*** Required equipment only for staff entering livestock or greenhouse facilities, crop fields or in direct contact with livestock**

It is the responsibility of the employee to ensure all equipment is available prior to the visit.

3 PROCEDURE

1) Respect any additional protocol, signs and barriers at the facility. Any additional mandatory equipment must be supplied by the agricultural owner/operator.

2) Park away from the barn if possible and only in authorized areas, away from ventilation outlets and inlets.

3) Clean, washable boots or clean, disposable boot covers should be worn while on the premises. Use footwear and clothing supplied by the operator when possible.

4) Clean or disposable coveralls must be worn when in direct contact with livestock, or when in livestock housing facilities. Staff in contact with crops should have coveralls available. Labcoats may be worn in greenhouses.

5) Inside the facility, only enter livestock areas when necessary. Avoid walking on feeding surfaces. Minimize traffic through feed storage areas. Stay on alleyways and sidewalks as much as possible. Do not contaminate housing or feeding areas with manure. Avoid direct contact with animals unless necessary.

6) When leaving the site, leave disposable materials with the owner/operator if possible. Otherwise, place the materials in a sealed garbage bag in the vehicle for later disposal.

7) Boots and field equipment must be cleaned prior to leaving the site. Excessive organic matter should be rinsed off prior to disinfection. To clean rubber boots and equipment, scrub all surfaces, including the soles, using a disinfectant solution, boot brush, and a large pail of water. Rinse the pail of all debris with clean water.

8) Put the boots, pail and equipment in the vehicle to air-dry away from other clean materials. Remove and store soiled coveralls in a garbage bag away from clean materials. Wash your hands with soap and water (or disinfectant lotion) and dry them with a disposable paper towel.

9) In the event the federal government imposes additional or replacement requirements during an outbreak of infection, they will apply.

4 COMMUNICATION

In the event of new contagious disease warnings in the province, the Provincial Veterinarian or plant pathologists will notify other government staff of additional biosecurity protocols or restrictions.

Nutrient Management Protocols
For
Ontario Regulations
Made under the
Nutrient Management Act, 2002

Local Advisory Committee Protocol

Draft for Discussion Purposes Only

November, 2002

TABLE OF CONTENTS

1 General

Local Advisory Committees ("LACs") can consult with the MOE and OMAF if they have questions regarding the Nutrient Management Act and it's application.
The Ministries are a tool to help the LACs and will attempt to provide technical guidance and assistance as appropriate.
Subject to the Municipal Freedom of Information and Protection of Privacy Act, R.S.O. 1990, c.M.56 as amended, mediations and reports generated from mediations are confidential.
Mediation does not prevent administrative or enforcement procedures from being carried out under an act.

3 General Procedure

3.1 *COMPLAINTS RECEIVED BY MUNICIPALITY*

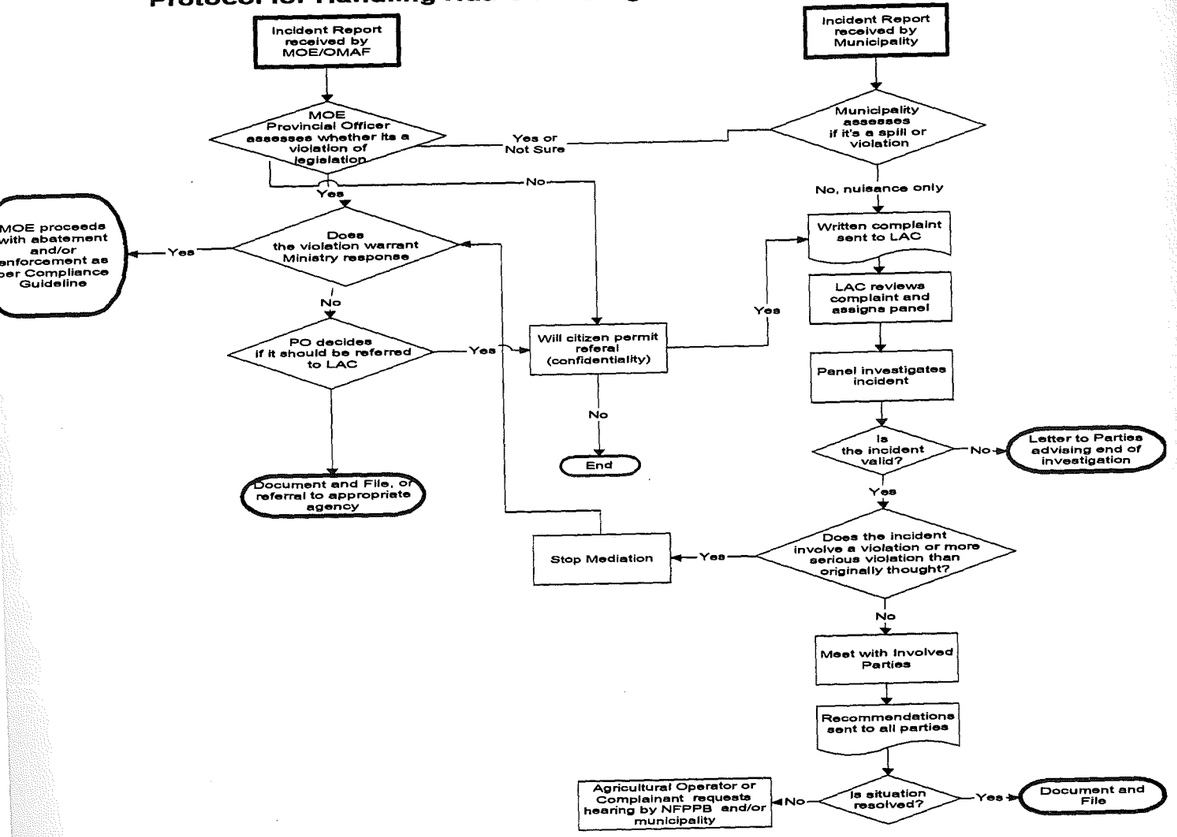
1. The Municipality receives a written report from the local citizen.
2. The Municipality assesses whether it is a spill or a violation
   a) If the report does not involve a spill or violation the incident is sent to the Local Advisory Committee
   b) If the report involves a spill or violation or the municipality is unable to determine whether a spill or violation has occurred the matter is referred to the MOE.
3. After the Local Advisory Committee receives the report the chairperson or vice chair assigns a panel of 3 to investigate the incident. At least one member of the mediation panel shall be from the same or a similar agricultural discipline to the agricultural discipline involved in the incident.
4. The panel looks into the matter.
5. If the panel determines that the report is not valid they write a letter to the parties advising them that the panel is no longer dealing with the matter.
6. If at any time during the mediation it is determined that a violation or spill has occurred the mediation is terminated in accordance with the stop mediation procedure.
7. If there are no violations and the report raises valid issues the panel meets with the parties to reach a resolution.
8. At the conclusion of the mediation the panel provides recommendations to the parties for the resolution of the matter.
9. The mediators involvement ends. The mediators file the results with the Local Advisory Committee.
10. If either of the parties are not satisfied with the outcome they may request a hearing by the Normal Farm Practices Protection Board or request that the matter be referred to the Municipality as appropriate.

3.2 *COMPLAINTS RECEIVED BY THE MINISTRY OF THE ENVIRONMENT*

1. The Ministry of the Environment will determine if the incident should be referred to the Local Advisory Committee.
2. After the Local Advisory Committee receives the incident report the chairperson or vice chair assigns a panel of 3 to investigate the incident. At least one member of the mediation panel shall be from the same or a similar agricultural discipline to the agricultural discipline involved in the incident.
3. The panel looks into the incident.
4. If the panel determines that the incident report is not valid they write a letter to the parties advising them that the panel is no longer dealing with the incident.
5. If at any time during the mediation it is determined that the incident involves a violation or spill more serious that the original mater referred to the Local Advisory Committee the mediation is terminated in accordance with the stop mediation procedure.

2 Mediation Protocol

Protocol for Handling Nutrient Management Incident Reports



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   a) If the report does not involve a spill or violation the incident is sent to the Local Advisory Committee
   b) If the report involves a spill or violation or the municipality is unable to determine whether a spill or violation has occurred the matter is referred to the MOE.
3. After the Local Advisory Committee receives the report the chairperson or vice chair assigns a panel of 3 to investigate the incident. At least one member of the mediation panel shall be from the same or a similar agricultural discipline to the agricultural discipline involved in the incident.
4. The panel looks into the matter.
5. If the panel determines that the report is not valid they write a letter to the parties advising them that the panel is no longer dealing with the matter.
6. If at any time during the mediation it is determined that a violation or spill has occurred the mediation is terminated in accordance with the stop mediation procedure.
7. If there are no violations and the report raises valid issues the panel meets with the parties to reach a resolution.
8. At the conclusion of the mediation the panel provides recommendations to the parties for the resolution of the matter.
9. The mediators involvement ends. The mediators file the results with the Local Advisory Committee.
10. If either of the parties are not satisfied with the outcome they may request a hearing by the Normal Farm Practices Protection Board or request that the matter be referred to the Municipality as appropriate.

3.2 *COMPLAINTS RECEIVED BY THE MINISTRY OF THE ENVIRONMENT*

1. The Ministry of the Environment will determine if the incident should be referred to the Local Advisory Committee.
2. After the Local Advisory Committee receives the incident report the chairperson or vice chair assigns a panel of 3 to investigate the incident. At least one member of the mediation panel shall be from the same or a similar agricultural discipline to the agricultural discipline involved in the incident.
3. The panel looks into the incident.
4. If the panel determines that the incident report is not valid they write a letter to the parties advising them that the panel is no longer dealing with the incident.
5. If at any time during the mediation it is determined that the incident involves a violation or spill more serious that the original mater referred to the Local Advisory Committee the mediation is terminated in accordance with the stop mediation procedure.

6. The panel meets with the parties to reach a resolution.
7. At the conclusion of the mediation the panel provides recommendations for the resolution of the incident.
8. The mediators' involvement ends. The mediators file the results with the Local Advisory Committee.
9. If either of the parties are not satisfied with the out come they may request a hearing by the Normal Farm Practices Protection Board or request that the matter be referred to the Municipality as appropriate.

4 Stop Mediation Procedure

If at any time during the mediation it is determined that the incident involves a violation or spill more serious that the original mater referred to the Local Advisory Committee the mediation is terminated in accordance with the stop mediation procedure.

1. The mediation process immediately stops.
2. The panel shall not discuss the issue further with any of the parties.
3. The panel advises that they must report the issue to MOE.
4. The panel calls the MOE and refers the original written complaint and briefly describes the reason for stopping the mediation.
5. At that point the panels involvement ends - The panel will not be used as tools for further investigating or prosecuting the farmer.

Ontario

Proposed Strategy
for
Five-Year Phase-out
Of the
Land Application of Untreated Septage

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The proposed strategy for implementing the phase out of the land application of untreated septage has several components, as follows:

- An immediate ban on the land application of portable toilet waste.
- A five-year phase out of the issuing of Certificates of Approval (Cs of A) for the land application of untreated septage. The phase-out of Cs of A for spreading septage would take place as follows:
  - Effective immediately, the Ministry of the Environment would not approve any new sites for the land application of untreated septage;
  - All requests for renewed approval of existing Certificate of Approvals for septage application sites would be reviewed to determine whether the materials could be accepted by local sewage treatment plants or other treatment facilities;
  - Approval of Certificate of Approvals for the land application of untreated septage on existing sites would be extended for no more than three years at a time; and
  - Ministry of the Environment would not accept applications for site Certificate of Approvals within the last 12 months of the phase-out.
- Extension of the winter spreading restrictions and land application standards included in the proposed Stage 2 Regulatory requirements under the *Nutrient Management Act* to septage.
- Requirement that municipalities prepare a strategy on how they will manage untreated septage produced within their area.

The phase-out of the land application of septage will have an impact on some municipalities as they may be required to develop the infrastructure to manage untreated septage. For some municipalities, this may mean an upgrade and/or expansion to their sewage treatment plant. The banning of untreated septage over a five year period will allow municipalities to work co-operatively to accommodate this additional material and to develop municipal septage strategies. It will also provide a period of adjustment for septage haulers and individuals with septic systems.

Further details on each of the strategy's components are provided below.

An immediate ban on the land application of portable toilet waste

Portable toilet wastes are generally collected separately from septic tank wastes, partly because portable toilets are often emptied at the same time as they are washed and serviced. Many suppliers of portable toilets are already disposing of their waste at sewage treatment plants.

The proposed ban on the spreading of portable toilet waste on land would become effective immediately on the adoption of the regulation.

Ministry of the Environment
Proposed Strategy for Five-Year Phase-out
Of the Land Application of Untreated Septage

Background

Septage is the generic name for waste from portable toilets, holding tanks, septic and aerobic systems. Ontario residents generate an estimated 1.2 million cubic metres of septage – or some 280 million gallons – a year, and this waste needs to be disposed of in an appropriate manner.

Currently, there are several septage disposal methods available across the province. These methods include:

- municipal sewage treatment plants;
- waste stabilization lagoons;
- approved septage land application sites; and
- waste disposal sites that are approved to receive septage, including landfills.

As a result of increasing concerns about the potential impact of the land application of untreated septage on surface and groundwater quality, the government committed to implementing a province-wide ban on the land application of untreated septage, phased in over the next five years. This commitment was announced as part of *the Nutrient Management Act* initiatives announcements on the introduction of Bill 81 on June 13, 2001 and re-iterated on April 2002 and August 20, 2002 as part of the announcements on the three-stage consultation under the Act.

The proposed strategy to ban the land application of untreated septage over a five-year period is part of the second stage consultations on proposed standards under the *Nutrient Management Act*. The second stage will see a series of meetings in locations across the province during December and January. The strategy for the phase-out of the Land Application of Untreated Septage will be one component of the discussion at those meetings. Details of the other elements of the second stage consultation can be found on the Ministry of Agriculture and Food's web-site www.omaf.gov.on.ca.

Consultation regarding the draft septage phase out strategy will be followed by a proposed regulation under the *Environmental Protection Act.*

Proposed Strategy for the Phase out of the Land Application of Untreated Septage

Provisions set out here would take effect on promulgation of the regulation.

The proposed strategy for implementing the phase out of the land application of untreated septage has several components, as follows:

- An immediate ban on the land application of portable toilet waste.
- A five-year phase out of the issuing of Certificates of Approval (Cs of A) for the land application of untreated septage. The phase-out of Cs of A for spreading septage would take place as follows:
  - Effective immediately, the Ministry of the Environment would not approve any new sites for the land application of untreated septage;
  - All requests for renewed approval of existing Certificate of Approvals for septage application sites would be reviewed to determine whether the materials could be accepted by local sewage treatment plants or other treatment facilities;
  - Approval of Certificate of Approvals for the land application of untreated septage on existing sites would be extended for no more than three years at a time; and
  - Ministry of the Environment would not accept applications for site Certificate of Approvals within the last 12 months of the phase-out.
- Extension of the winter spreading restrictions and land application standards included in the proposed Stage 2 Regulatory requirements under the *Nutrient Management Act* to septage.
- Requirement that municipalities prepare a strategy on how they will manage untreated septage produced within their area.

The phase-out of the land application of septage will have an impact on some municipalities as they may be required to develop the infrastructure to manage untreated septage. For some municipalities, this may mean an upgrade and/or expansion to their sewage treatment plant. The banning of untreated septage over a five year period will allow municipalities to work co-operatively to accommodate this additional material and to develop municipal septage strategies. It will also provide a period of adjustment for septage haulers and individuals with septic systems.

Further details on each of the strategy's components are provided below.

An immediate ban on the land application of portable toilet waste

Portable toilet wastes are generally collected separately from septic tank wastes, partly because portable toilets are often emptied at the same time as they are washed and serviced. Many suppliers of portable toilets are already disposing of their waste at sewage treatment plants.

The proposed ban on the spreading of portable toilet waste on land would become effective immediately on the adoption of the regulation.

Five-year phase out of Certificates of Approval for the land application of untreated septage

Since the land application of untreated septage is being banned over five years, the Ministry of the Environment will not approve any applications for Certificate of Approvals for new sites for the land application of untreated septage. This means that the Ministry of the Environment would only consider site applications to renew the Certificate of Approvals for existing sites.

As Certificates of Approval for land application sites for untreated septage require renewal, the Ministry of the Environment would require haulers to investigate whether there is a sewage treatment plant or other approved facility capable of taking and treating the septage within their service area. This capability would be assessed in the context of the local Municipal Septage Strategy. If another suitable treatment is available, the site approval for the land application of the septage would not be renewed.

To ensure that septage is not land applied any longer than is necessary, the Ministry Of The Environment will limit the time of renewals to no more than three years. Similarly, the Ministry Of The Environment will not accept applications for renewal of certificates of approval for septage spreading sites one year before the ban is scheduled to take place. This will ensure that haulers are planning ahead to meet the five-year timeframe.

Winter spreading restrictions

The restrictions on winter spreading – part of the stage two regulatory proposals under the *Nutrient Management Act* – would also apply to untreated septage.

Placing restrictions on the application of untreated septage on snow-covered or frozen ground, with additional requirements during the period from December 1 to March 31, would minimize risk to the environment. The additional restrictions would include setbacks from watercourses greater than those required under the Nutrient Management Act at other times of the year, requirements to incorporate the materials into the soil, and lower rates of application.

Land application standards

Land application standards included in the stage two consultation on the *Nutrient Management Act* would be applied to septage sites. These would include application rates, setbacks from wells including municipal wells; setbacks from surface water; setbacks from residential buildings, residential areas and designated health or educational facilities; and minimum depths to bedrock and groundwater.

Municipal Septage Strategies

All municipalities (upper tier, single-tier and lower-tier municipalities, if they are not part of an upper tier municipality which provides sewage service) would be required to prepare and submit to the Ministry Of The Environment, for approval, a Municipal Septage Strategy, one year after the regulation is adopted. Preparation of strategies, and agreements to manage septage would be encouraged at the upper tier and/or between neighbouring municipalities. The Ministry of the Environment will provide the formats for strategies and work with municipalities to achieve this time frame.

The Municipal Septage Strategy would be the equivalent of a Nutrient Management Strategy for septage.

Development of the Municipal Septage Strategy would be expected to involve consultation with stakeholders. The strategy would be required to address the current and projected five-year volume of untreated septage generated within the municipality and the way the septage would be managed. If capacity within municipality is insufficient to manage the septage, the municipality would be required to have an agreement with another municipality or a private facility for either treatment or disposal of the septage.

These strategies would be required to be updated as conditions change, and at least once every five years.

Consulting stakeholders and the public

The Ministry Of The Environment is committed to implementing the province-wide ban over the next five years. However, the ministry is also committed to consulting all stakeholders who are likely to be impacted by the ban on the best approach to implementing it.

This strategy is likely to have a financial impact on rural homeowners serviced by septic systems as municipalities move to full cost recovery for the treatment of sewage, including septage from these systems. The ministry will work with all stakeholders to understand the overall costs and impacts on municipalities and other stakeholders before finalizing the strategy.

Consultations will take place as part of the second stage of the development of regulations under Ontario's new *Nutrient Management Act*. The consultations will involve municipalities, septage haulers and members of the public with an interest in the issue.

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