INFOSHEET #17

USE AND MANAGEMENT OF MANURE AND OTHER ORGANIC AND/OR PRESCRIBED MATERIALS

How to address concerns identified in Environmental Farm Plan Worksheet #17

environmental farm plan
sustainably farmed

Based on Environmental Farm Plan Workbook, 4th ed. 2013

This infosheet outlines options to address problem areas for the use and management of manure and other organic and/or prescribed materials in your operation.

For prescribed material use in a Source Water Protection Zone, the risk management measures needed to address the risk will be determined through the Source Water Protection process in your particular area. The measures may be the same as or more than required by EFP due to the proximity to a municipal drinking water supply. For more information, contact your local municipality or check their website under Source Water Protection Planning.

All options in this infosheet are classed as **Actions, Compensating Factors,** or **Monitoring.**

- **Actions** address the identified concern, and will change the EFP rating to (3) or Best (4).
- **Compensating Factors** are alternatives that will adequately address the concern, but will not change the rating in the EFP worksheet.
- **Monitoring** is an alternative only in special circumstances. When and how monitoring can be used is explained in the infosheet.

In most cases, you'll need more information before choosing and implementing options. Sources for more information are listed at the end of this infosheet.

For help with technical terms, please see the full glossary in your EFP Workbook.

CANADIAN AGRICULTURAL PARTNERSHIP

Ontario

Canada

PRESCRIBED MATERIAL USE AND IMPACT ON THE ENVIRONMENT

17–1. Nutrient Management Plan

BACKGROUND

A nutrient management plan (NMP) is a living document that considers all nutrients on the farm with regard to crop needs and environmental impact.

When a NMP is prepared using the OMAFRA software program called NMAN:

- **red flags** signal that a planned practice will lead to a higher risk of environmental contamination
- **yellow flags** signal a caution, which could be an environmental risk or economic.

A detailed plan (with no red flags) will help you achieve optimum economic crop yields and product quality, and protect soil and water resources. By tracking on-farm nutrient use, a NMP will often help you reduce fertilizer input costs.

Without a plan, farmers may unknowingly apply nutrients at excessive rates, which could lead to contamination of surface and/or ground water, as well as an accumulation of nutrients in the soil.

Frequent manure applications in the past on many livestock farms have resulted in phosphorus soil test levels of greater than 30 mg/L (or 30 ppm). Above this soil test level, there is no additional crop requirement for phosphorus, and an increased risk of movement to surface water as soil test P increases. Phosphorus applied at a rate equal to crop uptake will help maintain current soil test levels.

A NMP also allows you to examine management practices and their effect on soil nutrients or environmental limitations. Nutrient balances can be evaluated on a yearly crop basis or over an entire rotation. It can be a record-keeping tool as well.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Complete a NMP. Include:

- testing of both soil and manure nutrient content
- crop nutrient needs, using soil test information and yield goals – or if soil fertility levels are adequate, estimate nutrients removed through crop removal
- emergency action plan for manure spills or manure system failures
- no red flags if using NMAN software.

OPTION 2 – ACTION

Complete a NMP as outlined above AND check that:

- phosphorus application rates do not exceed crop removal when soil phosphorus levels are over 30 ppm
- frequency of manure application will closely match phosphorus removal.

This will help maintain or reduce soil fertility levels over time.

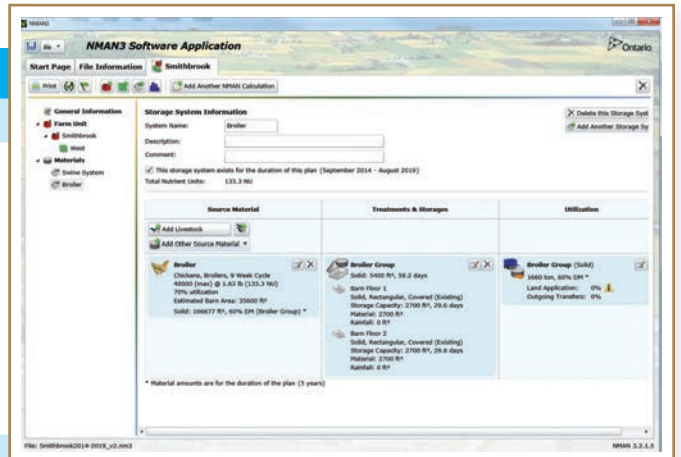
Attend courses, workshops, annual meetings to learn the latest in nutrient management.

Follow through with appropriate record-keeping:

- treat your NMP as a living document
- follow all aspects of your plan as closely as possible
- think of your NMP record-keeping as your farm diary.

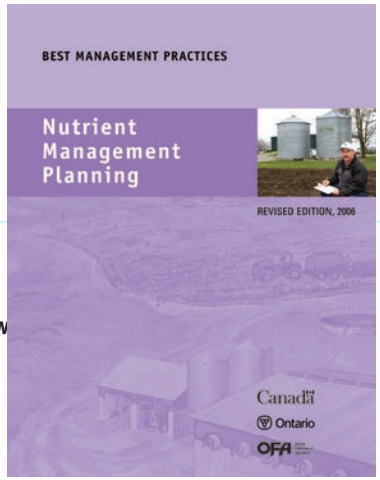
Note: If a NMP has been completed (without red flags and with follow-through of appropriate record-keeping), then you may move ahead to 17–5.

For floodplain-related questions, consult your local Conservation Authority.



A nutrient management plan (NMP) will help you achieve optimal crop yields and product quality, minimize fertilizer input costs, and protect soil and water resources.

Use Ontario's nutrient management planning and manure storage sizing software.



This BMP publication is an essential companion for anyone completing a nutrient management plan. Learn how to inventory nutrient sources, interpret results, plan application, keep records, monitor and adjust.

17–2. Ratio of livestock to farm unit acreage

BACKGROUND

To calculate the nutrient units (NU) on your farm unit, use the chart on pp. 184–186 in your EFP Workbook.

A concentrated amount of livestock can produce noise and odour. The risk of odour complaints and/or soil and water contamination increases when large volumes of manure are stored on the farmstead and/or applied to a small land base.

Many farms with completed NMPs have about 1 NU/cropland acre. When farms have 2 NU/acre (more livestock on a smaller land base), it results in the requirement for a higher level of management This helps ensure manure is applied at rates that minimize environmental risk while reducing input costs.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Lower the ratio of livestock to farm unit acreage:

- less than 0.6 nutrient units per acre – whether through land rental, manure agreements with neighbours or brokers, or land ownership
- this ratio allows manure application to crops that will have economic benefit from the nutrients applied.

OPTION 2 – ACTION

Lower the ratio of livestock to farm unit acreage:

- 0.6–1 nutrient units per acre – whether through land rental, manure agreements with neighbours or brokers, or land ownership.

A concentrated number of livestock can be a challenge in matching nutrients to the land available for manure application.

17–3. Land application of prescribed materials

BACKGROUND

When spreading Agricultural Source Material (ASM) and Non-Agricultural Source Material (NASM), keep in mind that additional nutrients are being applied.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Alternate fields receiving prescribed materials (ASM and NASM) annually or often enough to prevent an overabundance of nutrients in some fields.

Soil test regularly to know the fertility level in the field and keep it at a moderate level.

Reduce the amount of fertilizer applied by the nutrient value in the prescribed material.

Choose a new location in the field each time the prescribed materials ASM and NASM are applied. This will prevent an overabundance of nutrients in some areas.

17–4. Application rates – general

BACKGROUND

Unused nutrients such as nitrogen and phosphorus can build up in the soil.

While meeting the nutrient requirements of a particular crop, care must be taken to prevent buildup of unused nutrient materials.

Soils with high fertility levels for phosphorus contain more plant-available phosphorus than is required by most crops. Application of additional phosphorus is unlikely to provide an economical yield increase.

Whenever soil tests indicate rare or no probability of profitable crop response, applications of any source of phosphorus should be guided by a Phosphorus Index. The Phosphorus Index will rank the relative risk of phosphorus applied with the risk of surface water contamination. It also determines setbacks from watercourses where no application, application to match crop removal, or normal application rates are recommended.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Test soil. A soil test establishes the amount of nutrients already present in the soil.

Estimate the nutrients required to grow the crop:

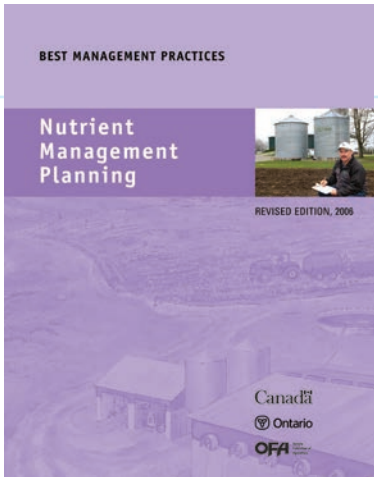
- determine the nutrient value of the material to be applied and calculate the amount that should be applied
  - generally phosphorus (and sometimes nitrogen) determine the material application rate – additional commercial fertilizer may be required to match crop needs
  - apply nitrogen based on the agronomic requirements of the crop, and phosphorus at the greater of agronomic requirement or crop removal over the crop rotation or application interval (note that once a soil test reaches 30 ppm of phosphorus, there is no further agronomic requirement for phosphorus with the exception of a few horticultural crops)
- spread nutrients accurately and uniformly.

Advances in manure spreader technology have increased the uniformity of distribution.

17–5. Liquid application rates

BACKGROUND

When applying liquid materials, be aware of the potential of the material to move down slope or even run off the field.



Refer to this BMP publication for guidance and considerations when determining application rates.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Apply the liquid material at rates that ensure material will travel no farther than 1 metre (3 ft) from point of application:

- an increase in the volume applied increases the possibility that the material will flow more than 1 metre (3 ft).

Slope and liquid runoff potential must be considered prior to application.

17–6. Nitrate movement to ground water

BACKGROUND

Nitrogen (N) is present in the soil and organic materials in three main forms: ammonium-N, nitrate-N and organic-N.

Much of the nitrogen in manure is in the organic form. In this form, it is not available to plants until it has been converted into ammonium-N. The rate at which this occurs depends on temperature, moisture and degradability of the organic material. Most ammonium-N is converted to nitrate-N in the soil before being taken up by plants.

During the fall, winter and early spring, when crops are not growing or taking up nutrients, the risk of nitrates moving below and out of reach of the root zone is highest. Sources of the excess nitrate include N left over after crop harvest (more applied than the crop used) and N from fall-applied manure.

Manure nitrogen is predominantly in the ammonium and organic form. The ammonium portion is converted to the nitrate form quickly during good growing conditions (i.e. late summer). These are the forms of nitrogen that the plant can use but also are more vulnerable to loss.

Manure applied after cereal harvest, in late summer and early fall on sandy soils without growing crops (i.e. cover crops), creates the highest risk for nitrate movement to ground water.

Manure applied in the fall on clay loam and clay soils will have little risk of leaching below the root zone. However, loss to the atmosphere due to denitrification is higher. Denitrication is the process where nitrate (NO_3) is converted to nitrogen gas (N_2) or nitrous oxide (N_2O).

WHAT CAN YOU DO?

OPTION 1 – ACTION

Use cover crops when applying nutrients in the fall to take up nitrogen and hold it in an organic form that is less vulnerable to loss:

- cover crops can include red clover, rye, rye grass, oilseed radish, oats or barley, a uniform stand of volunteer wheat, winter wheat crops, etc.
- when volunteer wheat is planned as a cover crop and wheat harvest is done with a wide-head combine, consider planting additional cereals between the "swaths" to even out the volunteer wheat stand
- weeds are not considered a cover crop due to their potential detrimental effect on subsequent crops.

OPTION 2 – ACTION

For fall nutrient application on fields without cover crops:

Apply late in the season, before freeze-up, when temperatures are lower.

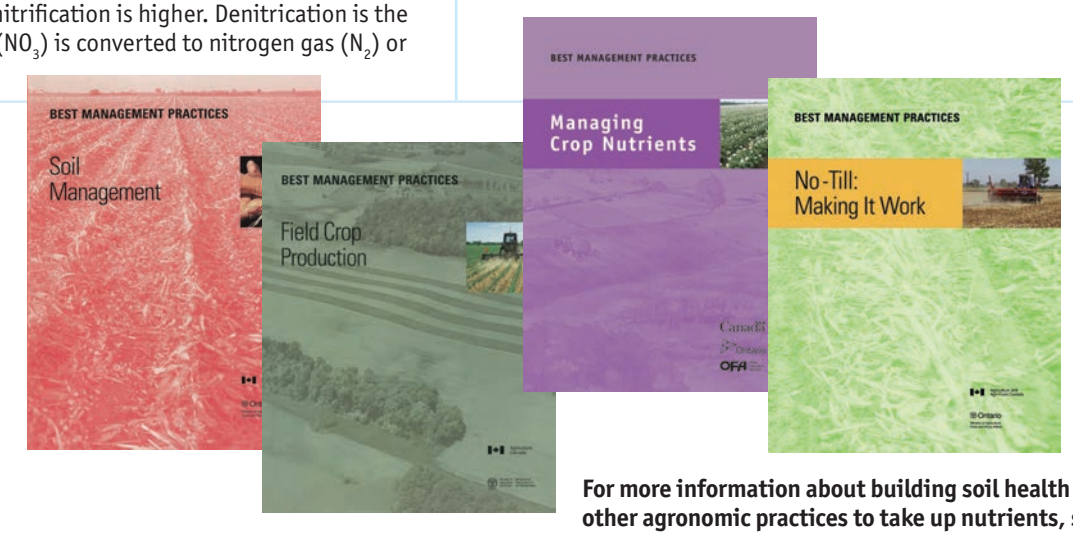
OPTION 3 – ACTION

For spring manure application:

Apply manure as close as possible to the time a crop can use the nitrogen:

- this is best from an economic and N-utilization perspective.

Following harvest of high N-use crops, cover crops can be sown to take up nitrates for release during the next growing season.



For more information about building soil health and using cover crops and other agronomic practices to take up nutrients, see these BMP publications.

17–7. Buffer alongside surface waters

BACKGROUND	WHAT CAN YOU DO?
Surface water (e.g. creeks and streams) can be contaminated by runoff from prescribed material applications in nearby fields. The establishment of a permanent vegetated buffer is recommended.	**OPTION 1 – ACTION** **Establish and maintain a permanent, 3-metre (10-ft) wide, vegetated buffer alongside surface water bodies:** • the buffer protects surface water by slowing down field runoff – allowing transported materials to settle out instead of running directly into the water.

A well-maintained permanent buffer alongside surface water bodies will slow and help filter field runoff.

17–8. Applying nutrients to fields with surface water within 150 metres (500 ft)

BACKGROUND	WHAT CAN YOU DO?
Nutrients in prescribed materials can become pollutants when they reach surface water. They include ammonia, phosphate, bacteria, and organic matter. To reduce the risk to nearby surface water, maintain the required setback distance from surface water and tile drain inlets. In addition, prescribed materials should be applied at appropriate rates based on crop need, but less than the runoff loading rates. Liquid loading rates are determined by considering the steepness of slope and soil texture. The steeper the slope and higher the clay content of the soil, the greater the possibility of liquid movement and risk to surface water. When prescribed materials are applied near surface water, there should be a separation distance adjacent to the top of the bank, depending on the type of prescribed material, slope, soil characteristics, and method of incorporation. A vegetated buffer strip adjacent to surface water will also help to reduce the amount of eroded soil and contaminants that may reach surface water. Application to areas of the field where a concentrated flow moves toward the surface water should be avoided. Spring-applied manure with melting snow, wet soils and frequent rainfall will increase the chance of runoff and erosion.	**OPTION 1 – ACTION** **Keep a minimum separation distance when spreading prescribed materials near surface water and incorporate within one day whenever possible:** • spread liquid manure and Category 1 NASM at least 30 m (100 ft) from surface water • spread solid manure and Category 1 NASM more than 15 m (50 ft) from surface water • spread Categories 2 and 3 NASM no closer than the limits set out in the NASM plan. Note: If soil tests for phosphorus are greater than 30 ppm, then phosphorus applied within 60 m (200 ft) of surface water from all sources should be minimal amounts (i.e. starter only).

When applying manure near surface water, maintain a separation distance to the top of the bank.

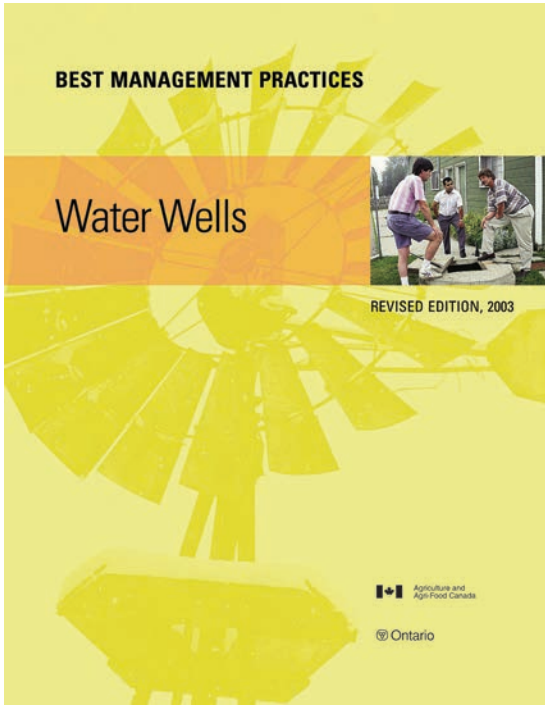
The actual distance will depend on manure type, slope, soil characteristics and method of incorporation.

These BMP publications can help you keep nutrients in the field and out of surface water. A Phosphorus Primer **follows "P" in its various forms in soil and water, and presents BMPs to manage it in livestock and crop production.**
Buffer Strips **shows several options for buffer strip design and plantings.**

17–9. Distance to wells

BACKGROUND	WHAT CAN YOU DO?
Contamination of wells can occur in two ways: • the well is poorly constructed, and surface water (with contaminants) enters the well, or • contaminants flow through the soil profile and enter the ground water. Poor well construction and shallow depths increase the risk of contaminants reaching ground water. An unused well that has not been properly plugged, sealed, and decommissioned is a direct pathway to ground water. If manure is spread directly over or near an unmarked well, the risk of contaminants entering the ground water is high.	**OPTION 1 – ACTION** Municipal well: **Apply all nutrients more than 100 m (330 ft) from any municipal well:** • this will cover a significant portion of the "2-year capture zone," which is the location where water moving below the root zone will reach the ground water within two years. Drilled well: **Apply manure farther than 15 m (50 ft) from a drilled well that has a watertight casing to a depth of at least 6 m (20 ft) below ground level.** Dug, sand-point or shallow-drilled well: **Apply manure more than 30 m (100 ft) from any of these well types.**

This BMP publication can help you better understand risks to well water quality, and what you can do to protect it. Water Wells **explains common well types, construction, maintenance, troubleshooting, and how to manage wells no longer in use.**



Wells that have not been properly abandoned are a direct pathway to ground water.

17–10. Manure testing

BACKGROUND

Different types of manure and other organic materials have very different nutrient values. Nutrient values can vary even from load to load in the same manure type.

By testing the manure for specific nutrients such as nitrogen and phosphorus, you will have a better idea of the amount of nutrients that are being applied to the soil. This will allow you to calculate the amount of additional fertilizer, if any, that will be required for the planned crop.

Knowledge of the nutrient value of manure (commercial fertilizer equivalent) will also help in obtaining manure agreements or in selling manure off-farm. Other common analysis include micronutrients (sulphur, magnesium, manganese, zinc, etc), carbon to nitrogen ratio (to determine if additional nitrogen may be required), organic matter and salts.

Manure analysis can be done at any Ontario laboratory accredited to do soil analysis. Analysis of the manure should include total nitrogen, ammonium nitrogen, phosphorus, potassium, and dry matter.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Test manure.

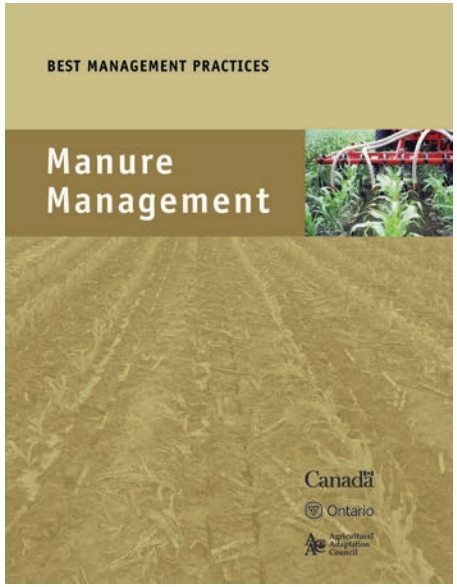
Begin by using average manure nutrient values to determine approximate nutrients that will be supplied by the planned application rate. Then, during land application, take a representative composite sample for analysis (each time the storage is emptied for three years or until you are satisfied that the analysis results are a good representation of the manure). For liquid manure, fill a clean plastic sample jar halfway to allow for some expansion without leakage. Store sample in a cool place until sending by courier or taken directly to a lab.

Manure analysis can be done at any Ontario laboratory accredited to do soil analysis. It should include total nitrogen, ammonium nitrogen, phosphorus, potassium, and dry matter.

Analysis results will help determine an application rate, and additional commercial fertilizer needs and/or adjustments. Management factors such as time to incorporation, season of application, and stage of crop growth will also impact available nutrients from the application.

While the manure analysis will give an indication of nitrogen levels, significant losses can occur after application if manure is not promptly incorporated, or is applied during the non-growing season or during prolonged wet conditions.

Only a small portion (5–20%) of organic N from manure is available for crops in the year of application. This will vary with livestock type, bedding, season of application, weather conditions, and organic matter levels in the soil. The remainder of the organic N becomes available over time.



Manure Management **includes step-by-step instructions for sampling manure. This BMP publication also explains manure content, how to mitigate concerns re: storage, odours and runoff, and how best to plan, set up and time its application.**

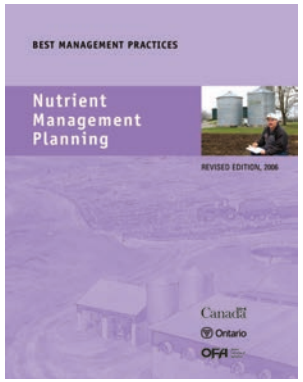
17–11. Calibration

BACKGROUND

It is important to measure the amount and uniformity of manure that is applied. Calibrating application equipment will help to avoid over- or under-application of nutrients.

Uniform application will help ensure consistent nutrient levels across the field.

Advanced technology and GIS/GPS monitoring tools are available to help improve rate calibration and uniformity of application.



WHAT CAN YOU DO?

OPTION 1 – ACTION

Calibrate application equipment periodically for level 3 and regularly for level 4.

Manufacturer's instructions/guidelines for equipment setup are a good place to start. However, in-field calibration will give the most accurate measure of manure/organic material applied. When combined with an analysis, this is the best form of record-keeping for rate and nutrients applied.

For solid manure:

- Place a sheet of plastic on the path of the spreader in the field and spread the manure. Measure the area of the plastic and weigh the manure deposited on the plastic and calculate the rate.

For liquid manure:

- Measure the area that the volume from one tanker load covers. This will give the average application rate per load and may also show the distribution across the width of application from beginning to end of load. Set a straight-edge pail and measure the depth in the pail. For site-specific measurements, go to page 87 of BMP Nutrient Management Planning booklet to calculate the application rate.
- Check for new equipment options that give a more accurate rate of application for liquid manure.

Calibrate application equipment to determine the amount and uniformity of manure that is being applied.

17–12. Soil conditions when manure/prescribed materials are applied

BACKGROUND

It is best to avoid spreading manure or prescribed materials on wet soil, due to the increased risk of soil compaction. Compacted soils slow infiltration, increase runoff potential, and affect overall soil health. Crops grown on compacted soils are often lower- yielding and have higher potential for root diseases.

Avoid surface-applying manure or prescribed materials to steeply sloping fields, especially near surface water. The risk of contamination due to runoff increases as the slope increases.

Avoid application if precipitation is expected, as this could lead to contaminated runoff reaching surface water. Where possible, incorporate all manure before rainfall occurs.

Incorporate as soon as possible to minimize nutrient loss.

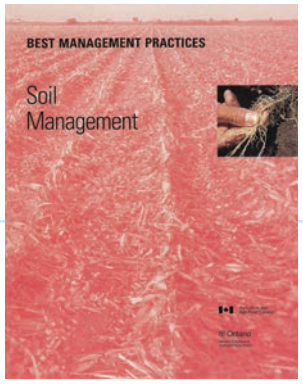
WHAT CAN YOU DO?

OPTION 1 – ACTION

Before application, wait until soil is dry enough to pre-till and/or cultivate, albeit with some risk of compaction.

OPTION 2 – ACTION

Before application, wait until soil is in optimal condition to pre-till and/or cultivate and risk of compaction is low.



Soil Management **is a practical BMP guide to help you diagnose soil problems and build up soil health and productivity.**

Avoid surface-applying manure or other organic materials to steeply sloping fields, especially near surface water.

See OMAFRA's Agronomy Guide for Field Crops, Publication 811.

17–13. Timing of incorporation when prescribed materials are applied

BACKGROUND

With liquid manure, the largest portion of the total nitrogen (50–75% or more) is in the ammonium form. This form is easily volatilized and lost to the air as a gas.

When manure is not immediately incorporated, there is increased odour and greater risk of ammonium-nitrogen loss. This risk is highest when weather conditions are hot and dry. Under these conditions, surface-applied liquid manure can lose up to 90% of the ammonium portion of the manure nitrogen within a few days of application. A gentle rain of approximately 10 mm will help incorporate manure nutrients.

Where manure is applied to living crops or high-residue fields, volatilization losses can still be significant, but lower than when applied to bare soil.

When manure is applied in weather conditions where soil/air temperatures are less than 10°C, microbial activity in the soil is reduced, which also reduces the rate of volatilization.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Incorporate or inject prescribed materials:

- most or all of liquid manure/organic materials – as soon as possible and within 24 hours, to minimize odour and ammonium-nitrogen volatilization
- most or all of solid manure/organic materials to tilled land – as soon as possible but before rainfall.

OPTION 2 – ACTION

On pasture, hay land, and no-till fields, apply manure/organic material at rates based on crop needs and site conditions.

See these OMAFRA resources:

- Soil Fertility Handbook, Publication 611
- Agronomy Guide to Field Crops, Publication 811

Injection units will help to keep applied nutrients in the soil, reducing the need for purchased fertilizers.

17–14. Custom applicators

BACKGROUND

Farms that are phased in under Nutrient Management Regulation and are hiring a custom applicator need to verify that the applicator has a Nutrient Management Act license that is up-to-date.

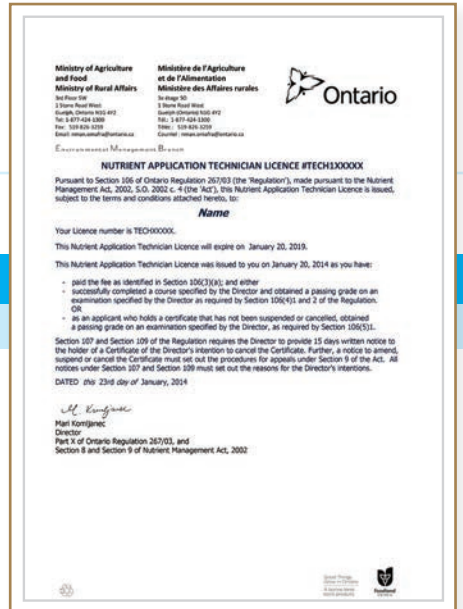
Request records of work done, such as volume applied, weather conditions, field locations and rates applied to each field, dates of application, and separation distances from sensitive features/water sources.

WHAT CAN YOU DO?

OPTION 1 – ACTION

When hiring a custom applicator, verify the following before any work begins:

- their NMA license is valid and up-to-date
- they will supply you with a report detailing manure application on your operation – it is for your protection in case a complaint arises
- their report will include information such as the dates of application, what fields, volumes applied, wind direction, weather conditions and any other pertinent information.



Ministry of Agriculture and Food
Ministry of Rural Affairs
Ministère de l'Agriculture et de l'Alimentation
Ministère des Affaires rurales
Ontario

NUTRIENT APPLICATION TECHNICIAN LICENCE #TECH1XXXXX

Pursuant to Section 106 of Ontario Regulation 267/03 (the 'Regulation'), made pursuant to the Nutrient Management Act, 2002, S.O. 2002 c. 4 (the 'Act'), this Nutrient Application Technician Licence is issued, subject to the terms and conditions attached hereto, to:

Name

Your Licence number is TECHXXXXX.

This Nutrient Application Technician Licence will expire on January 20, 2019.

This Nutrient Application Technician Licence was issued to you on January 20, 2014 as you have:

- paid the fee as identified in Section 106(3)(a); and either
- successfully completed a course specified by the Director and obtained a passing grade on an examination specified by the Director as required by Section 106(4)1 and 2 of the Regulation.

OR

- as an applicant who holds a certificate that has not been suspended or cancelled, obtained a passing grade on an examination specified by the Director, as required by Section 106(5)1.

Section 107 and Section 109 of the Regulation requires the Director to provide 15 days written notice to the holder of a Certificate of the Director's intention to cancel the Certificate. Further, a notice to amend, suspend or cancel the Certificate must set out the procedures for appeals under Section 9 of the Act. All notices under Section 107 and Section 109 must set out the reasons for the Director's intentions.

DATED this 23rd day of January, 2014

Mari Kontijanec
Director
Part X of Ontario Regulation 267/03, and
Section 8 and Section 9 of Nutrient Management Act, 2002

A custom applicator hired by a farm phased in under Nutrient Management Regulation must have an up-to-date NMA license, and be willing to provide you with detailed records of application on your fields.

17–15. Winter application of liquid prescribed materials (liquid manure, ASM or NASM)

Winter conditions defined as 5 cm (2 in.) or more of the soil is frozen in top 15 cm (6 in.), OR when ground is lightly snow-covered in 5 cm (2 in.) or more of snow.

BACKGROUND

Occasionally the opportunity arises to apply liquid manure and prescribed materials (with immediate incorporation) during winter months. However, winter manure application should never be part of the plan, but rather only part of a contingency plan.

When manure is surface-applied to soils that are frozen and/or snow-covered, there is little opportunity for infiltration, but great opportunity for environmental and economic risk from loss of the material. Snowmelt conditions are often accompanied with rain events, which results in surface flow of contaminated water into surface water (rivers, streams) or concentrated nutrients in ponded areas.

When winter application is part of a contingency plan due to inadequate storage, assess the risks of your land base for surface water contamination and select the area with the least risk.

WHAT CAN YOU DO?

OPTION 1 – ACTION

If liquid material/manure must be land-applied during frozen or snow-covered conditions, reduce risk of runoff:

- apply to a field that is farthest away from surface water and has a slope less than 3% within 100 m (330 ft) of the top of the bank of surface water
- inject or incorporate applied liquid manure within six hours of application.

OPTION 2 – ACTION

Get additional storage:

- transfer volume of material/manure to avoid overflow or winter spreading.

Liquid manure should not be routinely applied to snow-covered fields.

17–16. Winter application of solid prescribed materials (manure, ASM and/or NASM)

Winter conditions defined as more than 5 cm (2 in.) of frost in top 15 cm (6 in.) of soil OR when ground is covered in 15 cm (6 in.) or more of snow.

BACKGROUND

Solid manure and other prescribed materials should not be applied to frozen or snow-covered fields. The threat of the manure being carried to surface water by rain and snowmelt is of concern.

When winter application is part of a contingency plan due to inadequate storage, and stockpiling manure in a temporary storage is not an option, assess the risk of your land base for surface water contamination. Select the area with the least risk and incorporate the material within six hours.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Avoid winter spreading by using temporary field storage option to stockpile material in a safe location for spreading at a later date when crop conditions are better.

OPTION 2 – ACTION

If material must be winter-applied, reduce risk of runoff:

- apply to fields with less than 6% slope to reduce the risk of loss of nutrients by runoff, and more than 20 m (66 ft) from surface water
- if the field is more than 6% slope, spread and incorporate the material more than 100 m (330 ft) from surface water
- incorporate within six hours.

If application must take place, incorporate within six hours.

For more guidelines and tips for setup and timing of solid and liquid prescribed materials, see Manure Management, **a BMP publications. plan, set up and time its application.**

17–17. Transportation and transfer of manure from storage to field

BACKGROUND

When transporting manure from storage to field, it is extremely important to take steps to prevent a manure leak or spill

Spills can flow into surface water or leach into ground water, which could contaminate drinking water supplies as well as damage aquatic habitats.

Manure spills can also contaminate the soil by concentrating a large amount of nutrients, which will impair crop growth.

Contain the spill using commercial booms, plywood, earthen berms, bales of straw, or sand bags.

When moving manure from storage to field, consider wear and tear (axle weights) on the roads. Manure is never allowed on public road surfaces.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Precautions:

Install a chimney or riser over the loading hole so that manure does not spill on the road when starting and stopping.

Leave the area around the field entrance free of manure until the last load to prevent manure from reaching road surfaces.

Consider the time of year for application and potential municipal half-axle load restrictions while frost is coming out of the ground.

Contingency planning:

Prepare an emergency plan that outlines the steps to be taken if a manure spill occurs. Keep it handy and ensure everyone is familiar with it.

Reporting to Spills Action Centre and other measures in the event of a spill:

Immediately report any spills to the Ministry of the Environment, Conservation and Parks Spills Action Centre, 1-800-268-6060.

Eliminate the source of the spill by turning off all pumping equipment, plugging tile outlets, plugging leaks, and repairing or replacing broken lines.

Contain the spill using earthen berms, bales of straw, or sand bags.

Address any minor leaks immediately by repairing equipment and cleaning up a manure spill.

Utilize spilled manure/organic material on land at proper application rates.

17–18. Compaction

BACKGROUND

The person responsible for manure application must be aware of the danger of soil compaction in the field. There is no doubt that soil compaction has a negative effect on crop production and yield.

The type of soil, moisture content of the soil, axle weight, weight distribution, inflation of the tires, and type of tires are all important factors in determining the extent of soil compaction that will occur.

Soils with higher clay content tend to be more prone to compaction, especially when wet.

WHAT CAN YOU DO?

OPTION 1 – ACTION

In spring, or after a rain event, determine that the soil is in the proper moisture range before applying the manure:

- ensure adequate land base and storage capacity so that application to wet fields can be avoided. Fields with tile drainage often reach uniform ideal moisture levels more quickly.

Be aware of the total weight of manure and equipment, axle weights, number of tires and their inflation:

- where possible, choose tires on application equipment that minimize the tire footprint (i.e. radial tires at reduced inflation pressure in the field).

Low-pressure tires on application equipment can increase the surface area of the tire in contact with the soil surface, and help lower the risk of soil compaction.

17–19. Application of liquid manure using direct-flow system

BACKGROUND	WHAT CAN YOU DO?
A spill occurring when a pumping system control is left unattended can potentially result in large volumes of manure contaminating soil and water. To prevent a spill, a direct-flow system must have the capacity to be shut down at a moment's notice.	**OPTION 1 – ACTION** **Be able to shut down the pumping system at the first sign of any problem:** • one person operating the system stays within clear view of the field applicator, manure storage and pump, and is close enough to the system to shut it down within 1 minute of observing a problem. **OPTION 2 – ACTION** **Be able to shut down the pumping system at the first sign of any problem:** • two people operate the system with a radio link between them to shut down the system promptly. **OPTION 3 – ACTION** **Be able to shut down the pumping system at the first sign of any problem:** • one person with a radio-controlled shutdown system can stop the pump promptly.

In order to prevent a spill, a direct-flow system must have the capacity to be shut down at a moment's notice.

See OMAFRA factsheet:

- Automatic and Remotely Controlled Shut-off Systems for Direct-Flow Liquid Manure System, Order no. 04-091

17–20. Liquid prescribed materials applied on tile-drained land

BACKGROUND

Tile-drained land has many benefits. However, when liquid manure is applied on tiled land, extra precautions must be taken to ensure that manure does not move through the macropores (open passages that are preferential flow channels in the soil) directly to tile drains.

Macropores and cracks in the soil should be broken up by tillage before liquid manure can move through them. Pathogens and nutrients, including ammonium nitrogen and phosphorus, are the major concern for contaminating surface water.

Generally, the higher the application rate, or volume being applied, the greater the risk for preferential flow to tiles. When liquid or solid manure application is followed by a rainfall event, the risk for preferential flow increases. When rain is forecast, consider postponing the application or incorporating the manure as quickly as possible.

If your land has tile drains, it is important to prevent manure nutrients from flowing through them. If manure-contaminated water is entering tile drains, take immediate action to correct the problem.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Apply liquid manure when tiles are not flowing, and visually monitor drains when rain is not forecast within 24 hours.

OPTION 2 – ACTION

Cultivate and pre-till soil before applying liquid manure at recommended rates, and visually monitor drains.

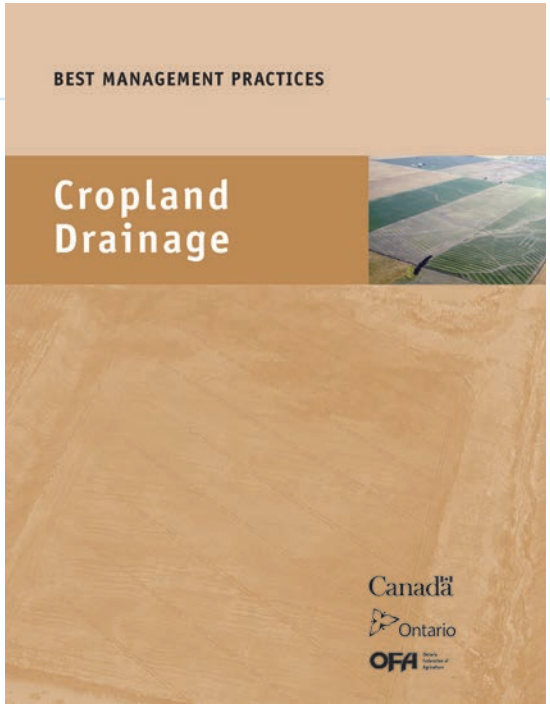
OPTION 3 – ACTION

Apply liquid manure at low rate (less than 16,300 L or 3,600 gal per acre).

OPTION 4 – ACTION

Apply liquid manure when tiles are not flowing, and visually monitor drains when rain is not forecast within 48 hours.

For much more information about surface and subsurface drainage, including systems, issues, maintenance, and troubleshooting, see this BMP publication.



When liquid manure is applied on tiled land, extra precautions must be taken to ensure that manure does not enter subsurface drains.

17–21. Application of Category 2 and 3 NASM materials (such as sewage biosolids, treated septage, food processing wastes, etc.)

BACKGROUND

Non-agricultural source materials can be used as a nutrient source for cropland. Before application, farmers must have an Environmental Compliance Approval from Ministry of the Environment, Conservation and Parks or a NASM plan prepared by a certified NASM plan developer. For all Category 3 NASM and some Category 2 NASM, this NASM plan must be approved by OMAFRA.

Non-agricultural source materials have restrictions and/or limits for metal content, maximum application rates, time of application, and separation distances that can be more restrictive than those for manure application.

These materials must be applied by a licensed applicator or the farmer. Farmers are advised to take the required applicator training to gain a good understanding of the regulations.

WHAT CAN YOU DO?

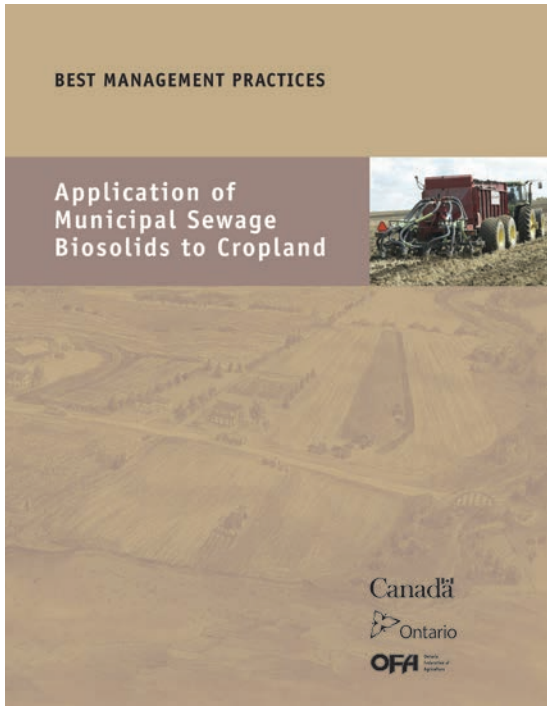
OPTION 1 – ACTION

Prepare a NASM plan. Get it approved. Follow your approved plan.

- all Category 2 and Category 3 non-agricultural source materials must have a NASM plan prepared by a certified person before land application
- a soil test has determined the crop nutrient needs, and non-agricultural nutrient sources have been accounted for in determining any additional nutrients needed from fertilizer – including non-agricultural sourced nutrients that were applied in the previous five years
- application setback distance to surface water and all well types as determined in the NASM plan are met.

OPTION 2 – ACTION

Prepare a NASM plan. Get it approved. Follow your approved plan. NASM is applied by licensed applicator or by trained farmer on his/her own farm.



To learn more about how sewage biosolids are processed, their benefits and risks when applied to cropland, and societal safeguards, see this BMP publication. It includes a set of BMPs for application.

To apply non-agricultural source materials to cropland, farmers must have a NASM plan prepared by a certified NASM plan developer.

FOR MORE INFORMATION

Ontario Ministry of Agriculture, Food and Rural Affairs

Many sources of supplementary information are available. Below are some suggestions to get you started. Most can be found online at **www.ontario.ca/omafra** or ordered through ServiceOntario.

FACTSHEETS

Automatic and Remote Controlled Shut-off Systems for Direct Flow Liquid Manure System, Order no. 04-091

PUBLICATIONS

Agronomy Guide for Field Crops, Publication 811

Soil Fertility Handbook, Publication 611

Best Management Practices

BMP publications are excellent sources to better understand on-farm environmental issues and discover a range of proven, practical options to address them. They are available at no charge to Ontario farmers. Below is a partial list. To order, see ServiceOntario information.

Application of Municipal Sewage Biosolids to Cropland

Buffer Strips

Controlling Soil Erosion on the Farm

Cropland Drainage

Managing Crop Nutrients

Manure Management

Nutrient Management Planning

Phosphorus Primer

Soil Management

Water Wells

SOFTWARE

NMAN/MSTOR – Ontario's nutrient management planning and manure storage sizing software

CONSULTATION

OMAFRA Environmental Specialists

LEGISLATION/REGULATION

Nutrient Management Act, 2002, O. Regulation 267/03, as amended, and associated protocols and guidance documents

www.e-laws.gov.on.ca/html/regs/english/elaws_regs_030267_ev006.htm#BK92

Inquiries to the Ontario Ministry of Agriculture, Food and Rural Affairs

Agricultural Information Contact Centre

Ph: 1-877-424-1300

Email: ag.info.omafra@ontario.ca

Web: **www.ontario.ca/omafra**

Many resources can be ordered through Service Ontario

Online at ServiceOntario Publications – **www.publications.serviceontario.ca**

By phone through the ServiceOntario Contact Centre

Monday–Friday, 8:30 am–5:00 pm

416-326-5300

416-325-3408 TTY

1-800-668-9938 Toll-free across Ontario

1-800-268-7095 TTY Toll-free across Ontario

Additional Resources

Local Conservation Authority (CA) – for floodplain-related questions

Best Management Practices books present in-depth explanations, tips and advice for Ontario farmers.

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