



INFOSHEET #4

FERTILIZER STORAGE AND HANDLING

How to address concerns identified in Environmental Farm Plan Worksheet #4



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

This infosheet outlines options to address concerns identified in your Environmental Farm Plan (EFP) as they relate to on-farm storage and handling of fertilizer products.

For fertilizer storages and handling facilities that are located 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 (4) Best.
- **Compensating Factors** are alternatives that will adequately address the concern, but will not change the rating in the EFP worksheet.
- **Monitoring** is an alternative in special circumstances only. When and how it 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 noted at the end of this infosheet.

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


MIXING AND LOADING – DRY OR LIQUID FERTILIZER

4-1. Distance from mixing/loading area to nearest surface water

BACKGROUND	WHAT CAN YOU DO?
<p>The greater the distance between the fertilizer mixing/loading area and surface water, the lower the risk of contaminating surface water supplies.</p> <p>Sloping topography and heavier soils will further increase the chance of contaminated runoff reaching surface water if a fertilizer spill occurs.</p>  <p>Always maintain or exceed minimum separation distances between mixing/loading areas and surface water.</p>	<p>OPTION 1 – ACTION</p> <p>Relocate the fertilizer mixing/loading area the required distance away from surface water:</p> <ul style="list-style-type: none"> the new mixing/loading location should change the final EFP distance rating to a (3) or (4) Best. <p>Note that moving a permanent structure could result in structural damage.</p> <p>OPTION 2 – ACTION</p> <p>Increase the flow path distance between surface water and the fertilizer mixing/loading area:</p> <ul style="list-style-type: none"> reshape land or build a diversion to direct runoff away from surface water to a location in the field or along a flow path where it will not likely reach surface water ensure any land-forming changes will not cause or increase erosion on your property or neighbouring lands seek professional assistance to site and design berms if considering such work, particularly along larger watercourses contact your local Conservation Authority to see whether a permit is required to do work adjacent to surface water, and for additional information ensure the flow path length meets or exceeds the minimum distance specified in the (3) category. <p>OPTION 3 – MONITORING</p> <p><i>For mixing/loading areas with an impermeable floor with no cracks or leaking, and a full curb installed to collect spills:</i></p> <p>Monitor the mixing/loading area on a regular schedule – visually checking for spills, leaks, cracks or seepage of liquids from the structure.</p>

For more information on handling dry fertilizers, see the Ontario Agri-Business Association’s site:
www.oaba.on.ca/dryfert.shtml

4-2. Distance from mixing/loading area to well

BACKGROUND	WHAT CAN YOU DO?
<p>The greater the distance between the mixing/loading area and the well, the lower the chance that a spill will collect in the vicinity of the well head and cause direct contamination.</p> <p>Also, if leakage out of the mixing/loading area reaches ground-water, contamination reaching the well is less likely if the well is located farther from the mixing/loading area.</p> <p>Soil type, depth to water table, and bedrock will also influence the contamination potential.</p>	<p>OPTION 1 – ACTION</p> <p>Locate the mixing/loading area the required distance away from the well:</p> <ul style="list-style-type: none">• the mixing/loading area should be downslope of well if possible• well water should be tested once a year for parameters such as nitrate until the new mixing/loading area is built• the new location should change the final EFP distance rating to a (3) or (4) Best. <p>Note that moving a permanent structure could result in structural damage.</p>
	<p>OPTION 2 – ACTION</p> <p>Drill a new well the required distance from the fertilizer mixing/loading area:</p> <ul style="list-style-type: none">• the old well must be properly abandoned according to Regulation 903 under the <i>Ontario Water Resources Act</i>• the new location should change the final EFP distance rating to a (3) or (4) Best• well water should be tested once a year for parameters such as nitrate.
	<p>OPTION 3 – MONITORING WELL WATER</p> <p><i>For existing fertilizer mixing/loading areas with an impermeable floor with no cracks or leaks, and a full curb installed to collect spills:</i></p> <p>Test well water at least once a year for parameters such as nitrate.</p> <p>Be prepared if test results show contamination – prepare a plan of action to help you quickly identify and address the source of contamination.</p>

The soil type, depth to water table and bedrock will all influence the potential for ground water contamination. For more information about soil types on your property, consult soil maps and reports for your area.

MIXING AND LOADING – LIQUID FERTILIZER


4-3. Spill or leak containment in mixing/loading area

BACKGROUND	WHAT CAN YOU DO?
<p>Fertilizer spills or leaks from the mixing/loading area must be contained and cleaned up quickly.</p> <p>Otherwise, they can contaminate ground water or run off the surface to contaminate streams, ditches, ponds, etc.</p> <p>If a water source is contaminated as a result of a spill or leak from a fertilizer storage, the landowner may be liable.</p>	<p>OPTION 1 – ACTION</p> <p>Construct a mixing/loading area with an impermeable floor, curb and permanent roof to exclude rainfall.</p> <p>OPTION 2 – ACTION</p> <p>Construct a mixing/loading area with an impermeable floor, curb, and drain to a holding tank large enough to contain all collected liquids.</p> <p>Consider these issues:</p> <ul style="list-style-type: none"> • volume of contaminated liquids collected in the sump as a result of rainfall on the mixing/loading area • cost of storage facility versus covering the mixing/loading area with a permanent roof • removal system for contaminated liquids in sump, including costs. <p>OPTION 3 – ACTION</p> <p><i>No regular mixing/loading area at one location:</i></p> <p>Mix and load product at application site, away from surface water, wells, etc.:</p> <ul style="list-style-type: none"> • may require a portable water supply • will require moving the loading site frequently in the field. <p>OPTION 4 – ACTION</p> <p><i>Regular or temporary mixing/loading done at field site:</i></p> <p>Use temporary plastic-lined berms for containment.</p>



A permanent roof is the best way to keep rainwater out of the mixing/loading area.

4-4. Backflow prevention on water supply

BACKGROUND	WHAT CAN YOU DO?
<p>The backflow from a fertilizer tank can quickly contaminate a water well or surface water.</p>  <p>Using a separate tank to supply water to the fertilizer tank will eliminate potential backflow.</p>	<p>OPTION 1 – ACTION</p> <p>Use a separate tank to supply water to the fertilizer tank:</p> <p>Pump water from a well or water source into the water supply tank and move it to the mixing/loading area, which would be located at an adequate distance from wells and surface water:</p> <ul style="list-style-type: none"> • determine the location and availability of water • determine the location for mixing/loading site. <p>OPTION 2 – ACTION</p> <p>Install a permanent anti-backflow device in the water supply line:</p> <ul style="list-style-type: none"> • place a check valve in the supply line near the tap. <p>OPTION 3 – ACTION</p> <p>Maintain a permanently fixed 6-inch air gap between the water supply line and the fertilizer tank.</p>

4-5. Filling supervision

BACKGROUND	WHAT CAN YOU DO?
<p>When applicator tanks are being filled, overfilling and spills can happen quickly with a moment's inattention. Surface and ground water contamination can result.</p>	<p>OPTION 1 – ACTION</p> <p>Ensure constant supervision of the applicator tank while filling.</p>

4-6. Handling system

BACKGROUND	WHAT CAN YOU DO?
<p>The less handling and exposure of liquids to open air, the lower the risk of a spill and contamination of surface and ground water supplies.</p>	<p>OPTION 1 – ACTION</p> <p>When transferring liquid material, be aware you are handling a dangerous material:</p> <ul style="list-style-type: none"> • install a closed system for the transfer of liquid products • when pouring by hand, provide easy access to the fill opening.



CLEANUP AND DISPOSAL

4-7. Disposal of rinsate (rinse water)

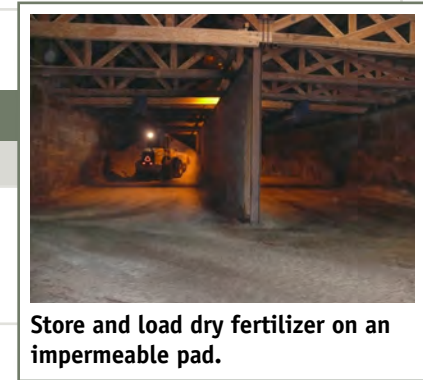
BACKGROUND	WHAT CAN YOU DO?
<p>Fertilizer rinsate must be treated in the same manner as the fertilizer itself, and applied to crops so as not to contaminate water supplies.</p>	<p>OPTION 1 – ACTION</p> <p>Apply fertilizer rinsate to field crop soil at adequate separation distances from surface water and wells to achieve a rating of 3 or better:</p> <ul style="list-style-type: none"> • collect each type of fertilizer rinsate separately so that nutrient value can be calculated, and to ensure there is no antagonism • apply rinsate only to the appropriate field crop at recommended rates.

4-8. Dry fertilizer (permanent mixing/loading area)

BACKGROUND	WHAT CAN YOU DO?
<p>Spills of dry fertilizer are to be contained and cleaned up as soon as possible so as not to contaminate water supplies.</p>	<p>OPTION 1 – ACTION</p> <p>Store and load dry fertilizer on an impermeable pad.</p> <p>Sweep pad down daily or immediately after any spillage:</p> <ul style="list-style-type: none"> • apply any spilled fertilizer to fields at recommended rates.

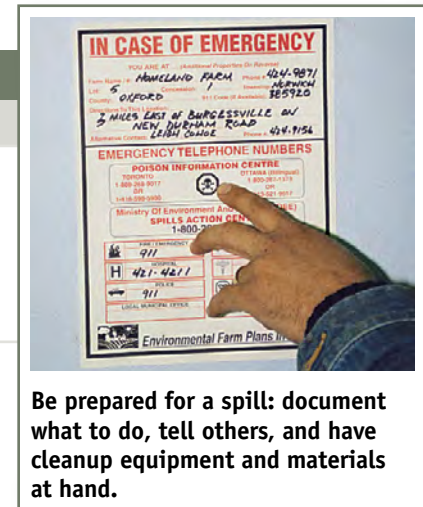
For more about planning and procedures, see also:

- 2014 Emergency Plans from the EFP Program
- OPEP Grower Pesticide Safety Course Manual



4-9. Management

BACKGROUND	WHAT CAN YOU DO?
<p>Without a written emergency plan in place and spill cleanup equipment available, the owner is very vulnerable to damages incurred as the result of a spill.</p> <p>Completing and displaying the emergency plan will make everyone aware of who to notify and what procedures to follow to halt the spill and then clean it up.</p>	<p>OPTION 1 – ACTION</p> <p>Prepare a written emergency plan and have spill cleanup equipment available either on your farm or at a readily accessible location:</p> <ul style="list-style-type: none"> • include essential details such as telephone numbers • keep the plan in a location where it is readily accessible • inform others on the farm of the plan and its location.



MANAGEMENT OF NH₃ (ANHYDROUS AMMONIA)

4-10. NH₃ management

BACKGROUND	WHAT CAN YOU DO?
<p>Because it is a compressed toxic gas, anhydrous ammonia (NH₃) is the most dangerous fertilizer product used in Ontario agriculture. It therefore demands a high level of careful handling and training.</p>	<p>OPTION 1 – ACTION</p> <p>Make everyone who may handle NH₃ aware of its dangers and the precautions to be taken:</p> <ul style="list-style-type: none"> • require safety training for everyone using NH₃ – training is available through most NH₃ suppliers • require all workers to be familiar with the emergency plan and its location • inspect all tanks, hoses and safety equipment before use, and replace or repair damaged equipment • supply operators with neoprene gloves and safety goggles when using NH₃ • attach safety water bottles to each piece of NH₃ equipment.



Safe handling of NH₃ requires training, equipment, and strict adherence to procedures. Everyone who may be involved in handling this gas should be trained accordingly.

4-11. Dry formulation (bag and bulk)

BACKGROUND	WHAT CAN YOU DO?
<p>The smaller the quantity of fertilizer stored on the farm, the lower the risk of spills and contamination of surface or ground water.</p>	<p>OPTION 1 – ACTION</p> <p>Have your fertilizer custom-applied:</p> <ul style="list-style-type: none"> • note that the availability of custom applicators, timeliness and economics could be a challenge. <p>OPTION 2 – ACTION</p> <p>Purchase only the quantity of fertilizer required to grow current, immediate crops:</p> <ul style="list-style-type: none"> • estimate required fertilizer quantities as accurately as possible • store no more than one tonne of fertilizer for longer than the immediate use period.



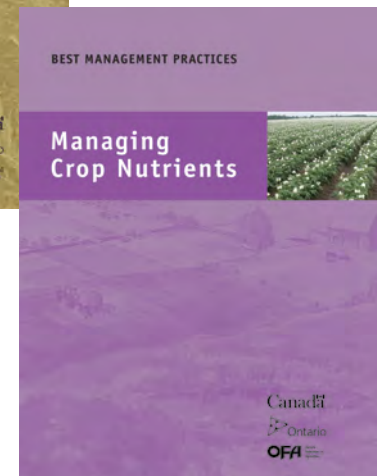
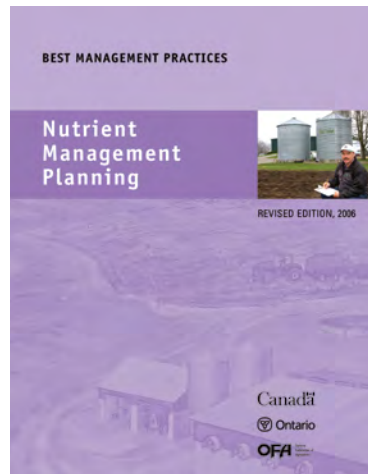
When you need fertilizer, purchase only the amount required and as close to the time of use as possible.

4-12. Liquid formulation

BACKGROUND	WHAT CAN YOU DO?
<p>The smaller the quantity of fertilizer stored on the farm, the lower the risk of spills and contamination of surface or ground water.</p> <p>When you need fertilizer, purchase only the amount required, as close to the time of use as possible. At all times use safe management. Take added precautions with liquid formulations, such as secondary containment.</p>	<p>OPTION 1 – ACTION</p> <p>Have your fertilizer custom-applied:</p> <ul style="list-style-type: none"> • note that the availability of custom applicators, timeliness and economics could be a challenge. <p>OPTION 2 – ACTION</p> <p>Purchase only the quantity of fertilizer required to grow the immediate, current crops:</p> <ul style="list-style-type: none"> • estimate required fertilizer quantities as accurately as possible • store no more than 200 L of fertilizer for longer than the immediate use period.




Liquid materials warrant special precautions, such as secondary containment.



OMAFRA has many resources to help you manage fertilizers, including these BMP publications.

LOCATION

4-13. Distance from fertilizer storage to nearest surface water

BACKGROUND	WHAT CAN YOU DO?
<p>The greater the separation distance between the fertilizer storage and surface water, the lower the risk of contaminating surface water supplies.</p>  <p>If a fertilizer spill occurs, sloping topography and heavier soils increase the chance of contaminated runoff reaching surface water.</p>	<p>OPTION 1 – ACTION</p> <p>Move the fertilizer storage the required distance away from surface water:</p> <ul style="list-style-type: none">• new storage location should change the final EFP distance rating to a (3) or (4) Best• most suitable for portable storage. <p>Note that moving a permanent structure could result in structural damage, and may be cost-prohibitive.</p> <p>OPTION 2 – ACTION</p> <p>Increase the flow path distance between surface water and the fertilizer storage:</p> <ul style="list-style-type: none">• reshape land or build a diversion to direct runoff away from surface water to a location in the field or along a flow path where it will not likely reach surface water• ensure any land-forming changes will not cause or increase erosion on either your property or neighbouring lands• seek professional assistance to site and design berms if considering such work, particularly along larger watercourses• contact your local Conservation Authority to see whether a permit is required to do work adjacent to surface water, and for additional information. <p>Note that the flow path length must meet or exceed the minimum distance specified in the (3) category.</p> <p>OPTION 3 – MONITORING</p> <p><i>For existing liquid storages that have secondary containment with an impermeable floor that is not cracked or leaking and a full curb/berm installed to collect spills, and for dry fertilizer storages with an impermeable floor:</i></p> <ul style="list-style-type: none">• monitor storage on an established schedule, visually checking for spills, leaks, cracks or seepage from the storage• install a locked tap on the liquid storage tank.

See the Ontario Agri-Business Association’s handy checklist for on-farm liquid fertilizer storage:
www.oaba.on.ca/checklist.shtml

4-14. Distance from fertilizer storage to well

BACKGROUND

The greater the distance between the fertilizer storage and well, the lower the chance of a spill collecting in the vicinity of the water well and contaminating drinking water.

Soil type, depth to water table and bedrock also influence contamination potential.



Test the well water once a year for parameters such as nitrate.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Locate storage the required distance away from the water well:

- storage should be downslope of well if possible
- the new storage location should change the final EFP distance rating to a (3) or (4) Best
- well water should be tested once a year for parameters such as nitrate until the new storage is in operation
- this is most suitable for portable storage.

Note that moving a permanent structure could result in structural damage, and may be cost-prohibitive.

OPTION 2 – ACTION

Drill the new water well the required distance from the fertilizer storage:

- the old well must be properly abandoned according to Reg. 903 under the *Ontario Water Resources Act*
- the new location should change the final EFP distance rating to a (3) or (4) Best
- well water should be tested once a year for parameters such as nitrate until the new water well is installed.

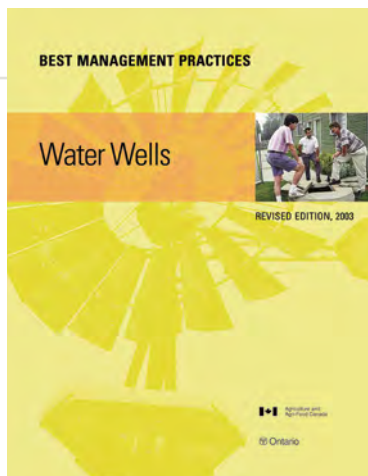
OPTION 3 – MONITORING WELL WATER

For existing liquid storages that have secondary containment with an impermeable floor that is not cracked or leaking and a full curb/berm installed to collect spills, and for dry fertilizer storages with an impermeable floor:

Test the well water once a year for parameters such as nitrate.

Note:

- monitoring of well water is NOT A SATISFACTORY SOLUTION – if a test reveals contamination, have a plan of action in place to immediately identify and address the source of contamination.




For more information about well construction, maintenance, and safeguarding well water quality, see this BMP publication.

4-15. Security


BACKGROUND	WHAT CAN YOU DO?
<p>Easily accessible, unlocked fertilizer storage buildings are vulnerable to vandalism and theft. They can also be a hazard to children playing in the area.</p>	<p>OPTION 1 – ACTION</p> <p>Have a dedicated locked fenced area or locked building, as well as:</p> <ul style="list-style-type: none"> • sight gauges and locks on valves • regular inspection of any tanks, valves and plumbing.
<p>Storage sites should be protected by security fencing and locks. Equipment such as sight gauges on liquid storage help with monitoring. Routine inspection of tanks, valves and plumbing to verify site security is advised.</p>	<p>OPTION 2 – ACTION</p> <p>Have a fenced area or building for storage that has no activities that could damage containers or spill fertilizer, as well as:</p> <ul style="list-style-type: none"> • sight gauges and locks on valves • regular inspection of any tanks, valves and plumbing.



4-16. Dry formulation (bag and bulk) containment

BACKGROUND	WHAT CAN YOU DO?
<p>For health and safety reasons, it is important to store fertilizer in a location where it will not contaminate water and not create a health hazard for humans and animals.</p>	<p>OPTION 1 – ACTION</p> <p>Store fertilizer in a locked, fenced area or separate free-standing storage building:</p> <ul style="list-style-type: none"> • fertilizer is stored on an impermeable surface • all spills are collected in a timely manner.
<p>Fertilizer should be stored in a separate facility where fumes, explosions and water from a fire will not affect the health and safety of humans and livestock.</p>	<p>OPTION 2 – ACTION</p> <p>Store fertilizer in one designated area that is partitioned off within another storage area in the same building:</p> <ul style="list-style-type: none"> • fertilizer may be stored on a permeable surface • any spills are collected in a timely manner.
 <p>Store fertilizer with care, so as to minimize risks to humans, animals, and water quality.</p>	<p>This option is not as costly as a free-standing separate storage.</p>

4-17. Liquid formulation containment


BACKGROUND	WHAT CAN YOU DO?
<p>Spills or leaks should be contained in the storage area so as not to contaminate ground or surface water. Impermeable floors can contain small spills and allow them to be easily cleaned up.</p>  <p>Ensure that the secondary containment area is impermeable.</p>	<p>OPTION 1 – ACTION</p> <p>Ensure that the secondary containment area is impermeable (e.g. sealed concrete, with full curb) and of sufficient size to contain a minimum of 110% of the volume of the storage of the largest tank:</p> <ul style="list-style-type: none"> • design and place the floor slab so that cracking will be minimized • do not have a floor drain • ensure there is a locked tap in place on storage tanks. <p>OPTION 2 – ACTION</p> <p>Construct a clay-lined berm system around the liquid storage to provide secondary containment of sufficient size to contain a minimum of 110% of the volume of the largest tank:</p> <ul style="list-style-type: none"> • ensure there is a locked tap in place on storage tanks. <div data-bbox="1486 435 2049 537" style="border: 1px solid black; padding: 5px;"> <p>See the Ontario Agri-Business Association’s handy checklist for on-farm liquid fertilizer storage: www.oaba.on.ca/checklist.shtml</p> </div>

4-18. Liquid formulation (tank integrity)

BACKGROUND	WHAT CAN YOU DO?
<p>A leak from the tank can have very serious consequences. It is therefore very important that the storage tank meets all requirements.</p>	<p>OPTION 1 – ACTION</p> <p>Ensure that the tank’s integrity meets the required standards:</p> <ul style="list-style-type: none"> • specific gravity rating of at least 1.5 • inspected on an established schedule.

For more information about preventing catastrophic tank failure, see these publications from Purdue University:

- for poly tanks – www.extension.purdue.edu/extmedia/PPP/PPP-77.pdf
- for fibreglass tanks – www.extension.purdue.edu/extmedia/PPP/PPP-93.pdf



Inspect storage tanks before, during, and after seasonal usage.

4-19. Small containers – 60 L (13 gallons) or less

BACKGROUND	WHAT CAN YOU DO?
<p>Clear and proper labelling is important to reduce the risk of improper use. Improperly mixed, some products can give off dangerous gases, creating a safety hazard.</p>	<p>OPTION 1 – ACTION</p> <p>Keep products in original containers with proper labels:</p> <ul style="list-style-type: none"> • keep sample labels on file in the farm office in case the original label becomes unreadable – most suppliers will supply product sample labels on request • make sure the containers have no holes and the metal/plastic is in good condition • recycle or dispose of damaged and unidentifiable containers at an approved site after they have been adequately rinsed of fertilizer solution.



4-20. Large containers – more than 60 L (13 gallons)

BACKGROUND	WHAT CAN YOU DO?
<p>Clear and proper labelling is important to reduce the risk of improper use. Improperly mixed, some products can give off dangerous gases, creating a safety hazard.</p>	<p>OPTION 1 – ACTION</p> <p>Keep product in original containers with proper labels. Keep sample labels on file:</p> <ul style="list-style-type: none"> • keep sample labels on file in the farm office in case the original label becomes unreadable – most suppliers will supply product sample labels on request • ensure container integrity and a proper tight lid • check that valves have no leaks and are locked • verify the site gauge is in place and can be easily read • dispose of damaged and unidentifiable containers at an approved disposal site after they have been adequately rinsed of fertilizer solution.



Keep products in original, clearly labelled containers.

For more information about empty container recycling/disposal, see:
www.cleanfarms.ca/programs_empty_pesticide

4-21. Liquid fertilizer storage monitoring

BACKGROUND

Monitoring of both the storage and the containment area on a regularly scheduled basis reduces the risk of loss of material.



Scheduled monitoring of both the storage and the containment area reduces the risk of loss of material.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Schedule monitoring and inspections, and keep records:

- daily visual inspections of secondary containment areas when in use will detect minor leaks before they become major
- yearly inspection of the storage tank and valve system prior to use is recommended
- inspection records should be kept onsite.

For more information about liquid fertilizer environmental containment and dyking guidelines, see Ontario Agri-Business Association's site: www.oaba.on.ca/fertguide.shtml

FOR MORE INFORMATION

Ontario Ministry of Agriculture, Food and Rural Affairs

Sources of supplementary information are available online at www.ontario.ca/omafra or ordered through ServiceOntario.

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

Agricultural Information Centre

Ph: 1-877-424-1300

Email: ag.info.omafra.ontario.ca

Web: www.ontario.ca/omafra

Ontario Ministry of the Environment and Climate Change

Water Wells & Groundwater Supplies, the Protection of Water Quality in Bored and Dug Wells, 2003

Water Wells & Groundwater Supplies, the Protection of Water Quality in Drilled Wells, 2003

www.ontario.ca/ministry-environment

Order through ServiceOntario

Online at ServiceOntario Publications – www.ontario.ca/publications

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

CleanFARMS – www.cleanfarms.ca

2014 Emergency Plans – available from the Environmental Farm Plan Program

Ontario Agri-Business Association – environmental guidelines for dry and liquid fertilizer handling
www.oaba.on.ca/fertguide.shtml

Ontario Pesticide Education Program – Grower Pesticide Safety Course Manual
www.o pep.ca

Stewardship Ontario – Orange Drop Program
www.makethedrop.ca

Tennessee Valley Authority, National Fertilizer and Environmental Research Center, Dealer Model Site Demonstrations – retail storage layouts
www.infohouse.p2ric.org/ref/50/49472.pdf (1992)

U.S. Environmental Protection Agency – fertilizer and pesticide storage
www.epa.gov/oecaagct/ag101/pestfertilizer.html

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Infosheet #4 Contributing Authors: Anne Verhallen (Chair), Helmut Spieser – Ontario Ministry of Agriculture, Food and Rural Affairs; Keith Reid – Agriculture and Agri-Food Canada; Tom Bruulsema – International Plant Nutrition Institute; Chad Anderson – Ontario Agri-Business Association Crop Inputs Committee; Ron Faubert – Ontario Soil and Crop Improvement Association

Infosheet Technical Editing Committee: H.J. Smith (Chair), Kevin McKague, Ted Taylor, Daniel Ward – Ontario Ministry of Agriculture, Food and Rural Affairs; Jim Myslik – Consultant

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. BMP publications are available at no charge to Ontario farmers. Some sample covers are shown here. To order, see ServiceOntario information.

