Professional Nutrient Applicators Association of Wisconsin
Level 1 Training Manual

Material Prepared by the University of Wisconsin-Extension Custom Manure Applicator Subcommittee of the Nutrient Management Team

Version 2.0, Released in 2013
Professional Nutrient Applicators Association of Wisconsin
Level 1 Training Manual
Version 2.0 January 2013

The purpose of this association shall be:

A. To promote the common business interests of those engaged in the biosolids application industry.

B. To encourage professionalism and accountability in business practices, and equipment and application methods, always in an environmentally sound manner and friendly manner.

C. To educate farmers and the general public about the advantages of environmentally responsible application.

D. No part of the net earnings of the corporation shall inure to the benefit of, or be distributable to, its members, directors, officers or any other private persons, except that the association shall be authorized and empowered to pay reasonable compensation for services rendered.

Material organized by the University of Wisconsin-Extension Custom Manure Applicator Subcommittee of the Nutrient Management Team. Members include:

Ted Bay - Grant County
Richard Halopka - Clark County
Jerry Clark - Chippewa County
Nick Schneider - Winnebago County
George Koepp - Columbia County
Kevin Erb - Conservation Professional Development and Training Coordinator
Kevan Klingberg - Discover Farms Outreach Specialist
Becky Larson - Biological Systems Engineering
Jim Leverich - On-Farm Research Coordinator
Cheryl Skjolaas - Agriculture Safety Specialist

For copies or to make suggestions, contact:
Nick Schneider, Winnebago County Agriculture Agent
625 E. County Road Y. Suite 600
Oshkosh, WI 54901
Phone: 920-232-1970
Email: nick.schnedier@ces.uwex.edu

PNAAW resources available online at: http://fyi.uwex.edu/wimanuremgt/

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Key Points:

- Recognize there are three levels to PNAAW Certification and know the expectations of each level.
- PNAAW has three levels of equipment performance standards.

Notes

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What is PNAAW?
The Professional Nutrient Applicators Association of Wisconsin was started in January 2001, by custom applicators throughout the state of Wisconsin, a few from Iowa and Minnesota, and with assistance from several UW-Extension Educators, DATCP, DNR, LCD, and USDA-NRCS personnel.

The main goal of PNAAW is to be an informational group and to promote application of manure, in accordance with the latest standards, and to do so in an environmentally friendly way. PNAAW member companies work with governing agencies, instead of against them. PNAAW has three levels of certification for employees.

What are the expectations of PNAAW certification levels?

Level 1 Certification
Designed to ensure that all employees have a working knowledge of:
- Manure spill response
- Nutrient management regulations
- Common sense application
- Manure handling and road safety

Level 2 Certification
Designed to deliver advanced training for crew supervisors and business owners
- 6-8 continuing education hours
- Advanced technical training on manure spill response, odor reduction, equipment calibration, safety, GPS, and other technical topics
- Offered in WI, MI and IL

Level 3 Certification
Development of an Environmental Management System (EMS)
- Created by each individual application firm - an EMS reduces risk by implementing regular training, equipment inspection and maintenance schedules
- Firms work with EMS professionals
- Reduces risk which may trigger insurance premium savings
PNAAW Certification and Performance Standards 2011
As revised March 7, 2011

At the December 17, 2010 PNAAW board meeting, the board approved significant changes to the PNAAW certification program. These changes include a new set of Performance Standards that will be incorporated into the certification program and are designed to provide a basic level of assurance to customers that the equipment used by trained and certified applicators meets a higher standard. These changes were discussed at the PNAAW 2011 Business Meeting, and were presented to the membership for feedback and discussion on March 7. Several changes and suggestions were incorporated into the Performance Standards at that meeting.

The Performance Standards are broken down into three categories – Bronze, Gold and Silver. Effective January 1, 2011, ALL FIRMS who wish to be certified under any of the current Levels (1, 2 or 3) must also meet the minimum requirements listed under the Bronze Level. Documentation of meeting this level must be provided to PNAAW before certification cards will be issued. Silver and Gold Levels are not tied to the certification program—they are optional for firms that choose to move to a higher performance standard.

The standards and implementation will be discussed at the 2012 annual meeting. PNAAW is gathering data on flow meter reliability, and it is anticipated that, pending the outcome, the frequency of flow meter calibration may change for future years for Silver and Gold.

A checklist for each level is available on the PNAAW website, and should be completed by the business owner. http://fyi.uwex.edu/wimanuremgt/certification-program/

BRONZE LEVEL

General Requirements

All equipment must be maintained in such a way that manure does not leak during transportation. Calibration of all equipment is required, and a record must be kept that includes the date, driver name, equipment serial number, and calibration information.

In the event of a spill, a PNAAW Certified firm must designate one person who will stay at the spill site until cleanup is complete. This person will be the primary contact for the farmer, agencies and your firm’s employees if questions arise or decisions need to be made.

- The goal is no spillage on public roads. Any manure that is spilled on the public roads must be dealt with immediately.

- Documentation of meeting each level’s requirements must be provided to PNAAW annually prior to granting of certification.

  Liquid tankers

- Equipment can be gravity flow or mechanically (air pressure, hydraulics, etc...) to unload spreaders or semi tankers.

- A small amount of drippage may occur from manure that is between the valve and the end of the splash pan, but the valve is tight when not applying in the field.

  Solids spreaders

- Must conform to manufacturer’s specifications no matter what type of manure is hauled (dry, semi solid or liquid). The goal is no spillage on public roads.
PNAAW Certification  Lesson 1

Drag hose systems
- Must be in good working order, hoses and fittings must be free of leaks.
- A properly installed, maintained and working flow meter is required.
- Operators must have a way to shut off or idle down the pumps within 30 seconds of leak detection—either remote control or a person stationed at the main pump.

SILVER LEVEL
General Requirements
- Firms desiring Silver Certification must meet all of the Bronze Level requirements.
- Calibration of flow meters requires a bench check. The bench check will be done with water and the meter should have a variable of no more than manufacturer’s settings. The testing method must be an approved method for the meter being tested. No one that uses a flow meter can test their own meters for certification purposes. It must be verified through a neutral 3rd party. Flow meter calibration records must include the date, operator name, equipment serial number, and calibration information.

Liquid tankers
- Discharge pipe must have a tight sealing valve
- Fill hole must have a butterfly lid or other means of minimizing spillage while in transport or if a roll over would occur.
- You must have a uniform spread pattern of a minimum of 8 feet wide, via splash plate, throughout the unloading process (from the time opening the valve to the closing of valve), at a set travel rate.

Solids spreaders
- Must conform to manufactures specifications, modifications can be made if it enhances the containment characteristics of the spreader.
- Any equipment put in service after 12/31/2010 must have a lid, tarp, or other means of preventing blow-off.

Drag Hose systems
- Flow meters must be calibrated once every 24 months.
- Have a regular schedule for a current PNAAW Level One Certified employee to patrol the entire length of the dragline to inspect for pinhole leaks or other signs of leakage, damaged hose or loose clamps. Line must include valves at a regular frequency or hose pinchers must be readily available.
- Accurate as-applied maps (preferably GPS) shall be provided to the farmer for every field.
GOLD Level

General Requirements

- Firms desiring Gold Certification must meet all of the Bronze and Silver Level requirements.

- All liquid application in the field must be metered with a flow meter. Solid manure must be scaled or weigh bared each load.

Liquid tankers

- The fill ports, if top loaded, must have a mechanical lid; whether it is a slide lid, an air locking or hydraulically locking lid, or other mechanical means of containing the load while in transport or if a roll over would occur. The goal is no spillage on public roads.

- If bottom loading, you must use a cap to seal the loading pipe during transport in case of valve failure.

- You must have a uniform spread pattern, via splash plate or mechanically operated splash pan, throughout unloading process, at a set travel rate, or operate in a way to achieve a uniform application rate across the field.

- All truck tankers/trucks must be able to pass a DOT inspection.

Solid spreaders

- If semi solids or liquids are hauled in this type of spreader, the spreader must have a lid. Dry or separated solids spreaders must use lids or tarps when hauling on public roads at any speed.

Drag hose systems

- Flow meters must be calibrated at least once every 12 months.

- A current PNAAW Level One or higher Certified individual will be traveling the feeder hose route at least once every half hour looking for signs of leakage, damaged hose or loose clamps. Line must include valves at a regular frequency or hose pinchers must be readily available.
Starting in 2011, PNAAW member firms desiring certification under levels 1, 2 and/or 3 must self-certify the PNAAW Performance standards. Certification cards/certificates will not be provided until the proper forms are received. **BRONZE** level self-certification is required for all firms to become certified under Level 1. Firms may voluntarily choose to complete the **SILVER** and **GOLD** certifications to document a higher level of performance.

Several areas require additional documentation (for example, calibration of tankers, flow meters, etc). For flow meters, attach a copy of the form provided by the firm doing the calibration. For tankers, a written record of the required information is sufficient.

Questions about the program can be directed to Kevin Erb at 920.391.4652. Completed forms should be submitted to Kevin Erb, UW Extension, 1150 S Bellevue St, Green Bay WI 54302, fax 920.391.4617

Firm Name: __________________________________________ Date: _____/_____/20__
Name of owner (printed) ___________________________ Signature: ____________________

**Equipment Operated**

- Liquid tankers (includes, but not limited to: tractor pulled, straight trucks, semis)
- Solid Spreaders (includes, but not limited to: truck mounted and tractor pulled units, designed for solid or semi-solid manure, also applies if used for liquid manure)
- Draglines (includes, but not limited to hose, hard hose and pipe systems, irrigators)

**Current Certification Level (2011)**

- Some employees Level 1.
- All Employees Level 1.
- Some Crew Supervisors Level 2/not always a Level 2 person on each job site.
- All Crew Supervisors Level 2/Always a Level 2 person on each job site.
- Firm is Level 3

**BRONZE LEVEL**

**General Requirements**

- All equipment is maintained so that manure does not leak during transportation.
- All equipment is calibrated, and documentation (including the date, driver name, equipment serial number/VIN/other ID, and result) is attached to this form.
- In the event of a spill, we will designate one person who will stay at the spill site until cleanup is complete. This person will be the primary contact for the farmer, agencies and my employees if questions arise or decisions need to be made.
- Our goal is no spillage on public roads. Any manure that is spilled on the public roads must be dealt with immediately.
Liquid tankers
☐ Does not apply (do not have this equipment). If checked, skip to next equipment type.

☐ A small amount of drippage may occur from manure that is between the valve and the end of the splash pan, but the valve is tight when not applying in the field.

Solids spreaders
☐ Does not apply (do not have this equipment). If checked, skip to next equipment type.

☐ Our spreaders conform to manufacturer’s specifications no matter what type of manure is hauled (dry, semi solid or liquid). The goal is no spillage on public roads.

Drag hose systems
☐ Does not apply (do not have this equipment). If checked, skip to next level.

☐ Our systems are in good working order, hoses and fittings are free of leaks.

☐ We have at least one properly installed, maintained and working flow meter for each drag line system in use.

☐ Our method of shutting off/idling down the pump within 30 seconds of leak detection is:
  ☐ Operator at manure storage
  ☐ Electronic/Remote

General Comments/Additions/Clarifications

SILVER LEVEL
General Requirements

We have met all of the Bronze Level requirements.

☐ Liquid tankers

☐ Does not apply (do not have this equipment). If checked, skip to next equipment type.

☐ Discharge pipes have a tight sealing valve.

☐ Fill hole has a lid or other means of minimizing splash while in transport or spills in a rollover.
  ☐ Butterfly lid
  ☐ Valve/Sealed system
  ☐ Other ________________________________________________________________

☐ Our equipment spreads a uniform spread pattern of a minimum of 8 feet wide, via splash plate, through-out the unloading process (from the time opening the valve to the closing of valve), at a set travel rate.
Solids spreaders

☐ Does not apply (do not have this equipment). If checked, skip to next equipment type. Conforms to manufactures specifications.

☐ Modified to enhance containment. List modifications: ____________________________

☐ Equipment put in service after 12/31/2010 has a lid, tarp, or other means of preventing blow-off. Attach a list of equipment, including make/model, serial #/VIN/ID, date put in service and type of containment.

☐ No equipment put in service BEFORE 12/31/2010. Attach list of equipment, including make/model, serial #/VIN/ID, date put in service.

Drag hose systems

☐ Does not apply (do not have this equipment). If checked, skip to next level.

☐ Each of our flow meters has been calibrated once in the last 24 months, using an approved method and variance is within manufacturer’s specifications. Documentation is attached to this form. It includes date, operator name/firm, equipment serial number, and calibration information.

☐ Draglines are patrolled on a scheduled basis by a current PNAAW Level One Certified employee to check for leaks and problems.

☐ Draglines have valves at a regular frequency or hose pinchers are readily available.
General Comments/Additions/Clarifications:

GOLD Level

General Requirements

☐ We have met all of the Silver and Bronze Level requirements

☐ All liquid application in the field is metered with a flow meter.

☐ Does not apply – we don’t spread with a liquid spreader

All solid/semi solid manure loads are weighed or spreaders have weigh bars.

☐ Weigh Bars

☐ All farms have scales available.

☐ Does not apply – we don’t spread with a solid spreader

☐ Accurate as-applied maps are provided to the farmer for every field.

Liquid tankers

☐ Does not apply (do not have this equipment). If checked, skip to next equipment type.

Fill Ports

☐ Top loaded fill ports have a mechanical lid; a slide lid, an air locking/ hydraulically locking lid, or other mechanical means of containing the load.

☐ Bottom loading tankers use a cap to seal the loading pipe during transport.

Spread patterns

☐ We achieve a uniform spread pattern across the entire field, via splash plate or mechanically operated splash pan, throughout unloading process, at a set travel rate

☐ We achieve a uniform spreading pattern across the entire field with a combination of driver training and spreading technique. Attach explanation of training and technique.

☐ All truck tankers/trucks are able to pass a DOT inspection.

Solid spreaders

Blow off prevention when on the road

☐ If semi solids or liquids are hauled, the spreader must have a lid.

☐ Dry or separated solids spreaders must use lids or tarps.

☐ Does not apply (do not have this equipment). If checked, skip to next equipment type.

Drag hose systems

☐ Does not apply (do not have this equipment).

☐ Each of our flow meters has been calibrated once in the last 12 months, using an approved method and variance is within manufacturer’s specifications. Documentation is attached to this form, and includes date, operator name, equipment serial number, and calibration information.

☐ Draglines are patrolled at least once every 30 minutes by a current PNAAW Level One Certified employee to check for leaks and problems.
Key Points:

- Safety: Our #1 priority.
- Operate with visibility and predictability. Many motorists struggle when interacting with farm equipment.
- Visibility is especially important during hours of darkness. Keep lights working and Slow Moving Vehicle signs clean.
- Manure can produce oxygen-deficient, toxic and/or explosive gases. Confined spaces create even more risks.

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Road Safety

When you pull out from a driveway, you're not looking to be involved in a crash. However, every time you leave a driveway you should be prepared and ready to avoid a crash. Two key aspects of roadway safety are visibility and predictability.

Visibility includes lights, flashers, turn signals, SMV emblem, extremity marking, and flags. Each of these items has an important role in making your equipment seen by other motorists. Questions and Answers on Lighting and Marking on Public Roads covers 6 common questions.

Predictability relates to your actions as the operator and communicating to the other motorists your actions. It also includes your actions as a defensive driver in paying attention to the actions of motorists and the roadway. Here are some key actions to help relay to motorists your future actions.

1. Use turn signals or hand signals. You are required by law to use turn signals or hand signals. Operators commonly comment that motorists don’t pay attention to turn signals. However, if you're involved in an accident and didn’t signal, you increase your liability for the accident.

2. Travel on the roadway. If you're driving half on the shoulder and half on the roadway, it’s sending a mixed message to the motorist behind you. It is better to use the whole lane of the road. Be careful to not cross over the center line. Now when that mailbox or narrow bridge comes up, you won’t need to pull as far back onto the road and take an action the motorist isn’t expecting.

Questions and Answers on Lighting and Marking on Public Roads

QUESTION #1: What lights are required on farm equipment?

Farm tractors and self-propelled farm implements operated or parked on a public road must have the same lighted headlamps and tail lamps as are required of other motor vehicles. This means that two headlamps and at least one red tail lamp are required. If a vehicle was originally sold with two tail lamps, both must be working. Tail lamps are to be mounted 20 to 72 inches off the ground.

Implements of husbandry, such as farm wagons or other non-self-propelled farm implements, must have either two red tail lamps or two red reflectors on the rear. Implements manufactured before 1984 are allowed to have only one lamp or two red reflectors. This is in addition to the SMV emblem.

Animal-drawn vehicles are required to have one white lamp visible from the front, and two red lamps visible from the rear marking the width of the vehicle. Reference: Wisconsin Statutes 347.10, 347.13, 347.21, 347.24

QUESTION #2: What about amber flashers and turn signals?

Although amber (yellow) flashers are not required by law, they are highly recommended and are authorized by law for any situation that requires caution by approaching motorists. Farmers, applicators and custom operators should strongly consider adding flashers to all tractors and self-propelled implements. Just like amber flashers, turn signals are not required on farm tractors or self-propelled farm implements by law. However, they are highly recommended, and should always be used if available.

Reference: Wisconsin Statute 347.26
QUESTION #3: Are there special requirements when pulling multiple wagons or implements?

Vehicle trains are defined by law and have special requirements. A typical train of agricultural vehicles would be a tractor and two towed units behind, such as two wagons or an implement and a wagon. No more than two units can be legally pulled behind a tractor without a permit, and the total length must not exceed 60 feet.

During darkness, a red light or red reflector must be located on each side of every vehicle in the train. The statute permits an SMV emblem to be used on the side, instead of a red light or reflector, but this is not recommended because it could easily confuse drivers and is not in conformance with engineering standards for SMV use.

During the day, two red flags, at least 12 inches square, must be displayed on the rear-most vehicle, on at each rear corner.

Reference: Wisconsin Statutes 347.32, 348.08

QUESTION #4: Should I use my lights during the day?

Although lights must be used on roads during hours of darkness, the best practice is to turn on headlamps, tail lamps, and flashers during the day or night. You want to be seen from as far away as possible by other drivers, and always using your lights is a smart idea that costs nothing.

QUESTION #5: What are the requirements for slow-moving vehicle (SMV) emblems?

SMV emblem requirements apply day and night. Any vehicles or equipment, including animal-drawn equipment, which usually travel at less than 25 mph, must have a slow-moving vehicle emblem. This is true day or night. If a tractor has a clearly visible SMV emblem that is not blocked from view by the implement being pulled behind, the implement is not required to have one; however, it is best to have an SMV emblem on every tractor and implement, even if both are visible. All SMV emblems must be bright and clean, and should be replaced if faded. The emblem must be mounted in accordance with the American Society of Agricultural Engineers standards, which means that it must be mounted or pointing upward, with the lower edge two to six feet off the ground, and either centered or as near to the left of center of the equipment as practical. The display of an SMV emblem for other purposes, such as to mark a driveway or mailbox, is prohibited. There is one exception to the SMV requirement, and that is for a vehicle or combination of vehicles that have an amber flashing light of at least four inches in diameter attached to the left rear. However, an SMV emblem is always recommended and is simply a good practice.

Reference: Wisconsin Statute 347.245

With a recent law change, drivers may pass a slow-moving vehicle in a no passing zone if the slow moving vehicle is traveling at less than one-half of the posted speed limit and the passing can be completed safely. Vehicles traveling slower than normal traffic must stay as far to the right side of the roadway as practical. This does not mean slow vehicles must drive on the shoulder of the road although this is allowed if there is room to do so safely.

QUESTION #6: Are there any other markings required?

During hours of darkness, any implement of husbandry that extends four feet or more to the left of the centerline of the towing vehicle must have an amber reflector mounted on the left side, facing forward, so as to mark the extreme width of the implement to drivers of oncoming vehicles.

Reference: Wisconsin Statute 347.24
In Hours of Darkness – Be Seen on the Road

Unfortunately, the majority of manure applications will happen during the time of year with some of the shortest hours of daylight. Road travel during harvest season always causes operators of farm machinery and trucks concern. Being out on the road during low-light or darkness increases the risk for a motor vehicle -farm equipment crashes. Visibility is a key safety factor any time you’re operating on public roads but required during hours of darkness.

What are considered “hours of darkness?”

**WI Statute 340.01 (23) defines Hours of Darkness as the period of time:**
- from one-half hour after sunset to one-half hour before sunrise
- and all other times when there is not sufficient natural light to render clearly visible any person or vehicle upon a highway at a distance of 500 feet.

Picking an example date of November 7, with sunset at 4:42 pm standard time (ST) and sunrise at 6:40 ST, hours of darkness starts at 5:12 pm ST and ends at 6:10 am ST. The time of sunrise and sunset vary around the state. These times can be found at: [http://aa.usno.navy.mil/data/](http://aa.usno.navy.mil/data/)

What do I need to improve visibility of farm machinery during hours of darkness or low-light?

**Start with the SMV emblem**

Slow-moving-vehicle emblems (SMV) are required day or night. A SMV emblem is required on any vehicle or equipment, any animal-drawn vehicle or any other machinery, including all road machinery, that usually travels at speeds of less than 25 miles per hour.

If your SMV emblem needs replacing, look for one that meets ASAE standard S276.6 or reads “certified compliance with ASAE S 276.6.” These signs use new materials that increase their visibility to 1200 feet.

**Add an Amber Flasher**

In some cases it may work best to add an amber flasher. There are a variety of styles from battery powered temporary amber flashers to hard wired types. State statutes read “a minimum 4 inch amber flasher.” Check with your local farm equipment dealer for options that would work best with your equipment. Remember there are other requirements that still need to be met for lighting and marking during hours of darkness. An amber flasher isn’t a total substitute but a good option for increasing visibility.

**Increase your extremity markings**

Extremity marking tapes are also available in new materials like the SMV. Extremity markings are valuable in helping motorists determine the widths of your machinery. This can be especially valuable in passing situations.

**Lights, Turn Signals and Reflectors should be clean and present**

It’s best to make cleaning lights and reflectors a part of your daily maintenance check. Dust and mud build-up can reduce the effectiveness. You want to be seen bright and bold in the daylight or darkness. Check that lights and turn signals are working properly.

Also, use your turn signals when out on the road. A turn signal is a warning signal to motorists. If turn signals aren’t present, use hand signals. You have a responsibility as a driver too.

**Don’t be in the dark – Be Seen**

When heading out on the public road, being seen by motorists is an important step in your safety. Stopping distances are short between motor vehicles and farm equipment. Give yourself every advantage to be visible for motorists.
Confined Spaces

An upright silo, manure pump reception pit, and grain bin are example confined spaces that are common in agriculture. OSHA defines a confined space as a space that:

- Is large enough and so configured that a person can bodily enter and perform assigned work;
- Has limited or restricted means for entry or exit; and
- Is not designed for someone to continually be in it.

Additional criteria make some spaces to be classified as "permit-required". These additional criteria are:

- Contains or has a potential to contain a hazardous atmosphere;
- A material that has the potential for engulfing an entrant;
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section, or
- Contains any other recognized serious safety or health hazard

Confined spaces such as manure reception pits and their enclosures can have elevated levels of toxic gases. Devices such as gas monitors will measure the risk of hazardous gas content.

Manure Storage/Handling

With manure systems the atmosphere in the confined space is a major concern. It is important that everyone working in and around manure systems understand the hazards of manure gases, symptoms of exposure and what to do should an emergency occur. The most serious problems with gases occur when manure is agitated, when ventilation systems are inadequate, or fail. However, gases are constantly being produced and there is never a "safe" time to enter a pit or other confined spaces, such as tanks, within a manure handling system.

To reduce the danger of manure pit gases, take the following precautions:

- **Never enter a pit**, especially during or just after agitation. Without testing for toxic gases, there is no way to know if it is safe.
- **If absolutely necessary** to enter a pit or other confined space with manure, always wear a self-contained breathing equipment with oxygen supplying tanks. Cartridge respirators are not sufficient.
- **Always wear a safety line** and work with at least two other people outside the pit.
- **Remove all people** and all animals from buildings over pits before pit agitation.
- **Provide maximum ventilation** when agitating or pumping manure.
- **Do not smoke** or have any other fire or ignition source around manure pits.
Procedures to follow when entering manure storage and handling systems that are identified as a confined space.

1. Follow your company’s confined space procedure. If your company’s procedure indicates “no entry” that means “no entry”. Thinking that an action will only take a second, may take a life. Company’s confined space procedure is located _______________________.

2. Remember that your company is working on a host farm and under OSHA additional requirements may need to be followed.

3. Know that the only accurate measure of gas levels is an appropriate gas monitor. In working with manure system and handling confined spaces a 4 gas monitor is recommended. Individual operating the monitor should be trained in the proper use of the monitor and follow manufacture protocols on calibration and testing.

4. Understand the dangers of manure gases. There are four main gases produced with the decomposition of manure. These gases are methane, carbon dioxide, ammonia and hydrogen sulfide. Each gas has unique characteristics that are important to know. The primary hazards of these gases are toxicity, asphyxiation, and potential for an explosion.

5. Report any health concerns to the appropriate supervisors.

If at any time an employee of your company or the host farm, goes down in a confined space, DO NOT ENTER AND ATTEMPT RESCUE. IMMEDIATELY proceed to follow your emergency response procedures with a call to 911. Company’s emergency response procedures are located___________________________.

Safety Tip: A cartridge respirator is NOT adequate. Breathing apparatus must supply air as well as seal out toxic gasses.
Characteristics of Manure Gases Include:

**Methane (CH\(_4\))**
- is a non-toxic gas that is odorless, colorless and lighter than air.
- is highly flammable and a spark from equipment, poor wiring, or welding could provide an ignition source for an explosion or fire.
- is an asphyxiant and will cause rapid breathing, dizziness and fatigue; symptoms similar to a heart attack from the oxygen reduction. Generally, once a person receives oxygen recovery is likely.

**Carbon Dioxide (CO\(_2\))**
- is heavier than air and will displace oxygen.
- may result in headaches and dizziness.
- may cause death by asphyxiation at high concentrations.

**Ammonia (NH\(_3\))**
- has a sharp pungent odor and is generally higher in poultry manure.
- is lighter than air.
- causes irritation of the eyes and respiratory tract.
- may cause permanent lung damage as in the respiratory tract it may cause alkaline lesions.
- exposure requires medical treatment.

**Hydrogen sulfide (H\(_2\)S)**
- will increase levels a thousand-fold during agitation.
- is an extremely toxic gas.
- is the most dangerous part of the manure gas as it is colorless, heavier than air, and may cause death in seconds at high concentrations.
- is commonly known for its rotten egg odor at .005-0.1 ppm but the lack of this odor is misleading. At 100 ppm the concentration of hydrogen sulfide will take over the human sense of smell, it will be present but a person wouldn’t be able to smell it.
- is highly water soluble which allows it to dissolve in eye moisture and the respiratory tract.
- has symptoms that include eye irritation and respiratory but it will affect a person’s central nervous system.
- exposure signs that the entrant may display include dropped tools, speech problems or problems with movement.
- exposure requires medical treatment.
Non-Enclosed Manure Storage Safety Tips

Injuries and fatalities occur in confined space manure storages that are enclosed, such as beneath animal quarters; or below-ground reception and pump out pits; and in non-enclosed earthen, synthetic, or concrete lined manure storages. Non-enclosed manure storages are open to the atmosphere but may meet the definition of a confined space in terms of occupational safety and health based on storage design and employee exposure to hazards.

In the case of non-enclosed manure storage, hazards may include:

- A thick liquid and floating crust that make swimming, buoyancy, or even moving around very difficult.

- Steep and slippery slopes that can make getting out of manure storages difficult or impossible.

- An acceleration of hazardous gases (primarily methane, hydrogen sulfide, carbon dioxide, and ammonia) released from manure due to movement, agitation, removal, or addition of manure to storage.

- Localized layers of hazardous gases existing above manure surfaces, especially on hot, humid days with little to no breeze.

- Not having sufficient oxygen to breathe if a person is ‘treading’ in manure because of inability to get out.

- Not being able to see into depths of manure like you can with clear water.

- A slow response time for adequate emergency actions because of site isolation and remoteness.

- Potentially hazardous equipment in and around the manure storage.

Safety guidelines to follow:

- Make sure everyone near manure storage structures understands the hazards that exist, including symptoms and effects that the various manure gases have on their health.

- Explosive gas may settle in pockets near where agitation or pumping is occurring. No smoking, open flames or sparks should be allowed.

Non-enclosed manure storage should be assessed to determine employee exposure to safety and health hazards.

One potential hazard is someone falling into the storage and being engulfed in the manure slurry.

Agitation accelerates the release of hazardous gases. Employees should know the signs and symptoms of these gases.

OSHA requires warning signs to be posted in English but a recommended safety practice is to post in additional language based on your workforce.
Safety

Lesson 2

- Make sure the non-enclosed manure storage has a fence installed around the perimeter and access gates are locked to keep unauthorized personnel from entering the area.

- Post warning signs including manure drowning hazard signs and “Danger Manure Storage” or “Danger Keep Out,” or “Danger Keep Away.” on all sides of non-enclosed manure storage. If possible, these signs should be located by gates.

- Keep bystanders and non-essential workers away from non-enclosed manure storage during or other accessible areas during when pump out operations are in progress.

- Wear a safety harness with life-line attached to a safely located solid object or anchor at any time you enter the fenced in area of non-enclosed manure storage. If retrieval is needed, this equipment will improve the possibility of a successful rescue.

- Never work alone. The second person’s role is to summon help in an emergency and assist with rescue without entering the manure storage.

- Move slowly around unenclosed manure storages as the ground can sometimes be uneven and may cause a person to trip or stumble.

- Understand equipment being used and have emergency shut-down procedures prepared.

- If equipment malfunctions or maintenance is required during agitating or pumping of the manure, shut all equipment off and remove it from the manure storage before servicing or repairing.

- If you feel unsure or uncomfortable with what you are getting ready to do near the manure storage; wait a moment and reconsider the action, contact a supervisor or farm manager, and review the situation before proceeding.

- Be prepared to call 911 in case of an emergency. Being prepared includes providing specific directions to the site of the emergency, accurately describing the incident, and number of victims.

Adapted from Open Air Manure Safety Storage Tips, Penn State University, June 2012. Authors: Dennis J. Murphy, Extension Safety Specialist, Agricultural and Biological Engineering; Robert Meinen, Senior Extension Associate, Animal Science Department, Davis E. Hill, Senior Extension Associate, Agricultural and Biological Engineering.

UW Madison, Biological Systems Engineering Contributors:
Cheryl A. Skjolaas, Interim Director/ Agricultural Safety Specialist, UW CTR for Agricultural Safety and Health David Kammel, Extension Agriculture Building Design Specialist Brian Holmes, Extension Farmstead Engineering Specialist Rebecca Larson, Extension Bio-Waste Specialist
Spill and Emergency Response  Lesson 3

Key Points:

- Control the spill.
- Contain the spill.
- Cleanup the spill.
- Contact authorities.
- Document actions.

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What is a spill? A spill is any release that has the potential to threaten ground or surface water. A spill is site specific, 3,000 gallons applied on an acre of cropland is not the same as 3,000 gallons applied a few feet from a stream.

All employees (from tractor driver to welder (and even office secretary or spouse, as they may be the first person a newer employee reaches when a problem occurs)) should know what to do when a spill happens.

The best preparation is to have a spill response plan.

Plans should be simple enough to remember, but complete enough to do the job.

Plans should include a listing of relevant cell phone numbers.

Spill Response Steps: (Your employer may have a specific set that should be followed)

Consider the following scenarios: You’re hauling a loaded manure tank down a road when the shoulder gives way and the tank rolls into the ditch spilling its load of manure; or a hose coupler breaks on the manure dragline allowing manure to flood the area. In both situations, having a written emergency response plan will be critical in those initial moments to keep a bad situation from getting worse.

There are four C’s to consider as part of an emergency response plan:

First, CONTROL THE SPILL. How quickly can someone at the farm shut down a manure pump and close the appropriate valves? Can the hose be clamped or a tractor tire parked on the hose to stop the flow? In the case of a manure tank, there may be very little that can be done to prevent manure from escaping a broken valve or cover.

Secondly, CONTAIN THE SPILL. Your emergency response plan will list names and contact information of contractors with earthmoving equipment, septic haulers and other key contacts to help contain the spill. If the spill is in a ditch, construct an earthen dam to contain the manure. If the incident happens in the field, consider the nearby sensitive areas that need immediate protection to avoid manure from entering surface or ground water.

A tractor and chisel plow can roughen the soil surface to slow the movement of manure. Large square or round bales can be used as a dam and to absorb liquid. A culvert can be blocked by placing a sheet of heavy plastic and a piece of plywood, or other sturdy material, in front of it to prevent manure from flowing through and create a dam.

The third task is CLEANUP THE SPILL. A loader and spreader might be all that’s needed to remove excess manure in some cases. With liquid spills, the vacuum truck of the local septic business or specialized manure tank can suction 2500 to 7500 gallons in a matter of minutes. The earthen dam that was built in a field or road ditch to contain the spill serves as a perfect sump for this equipment.

In certain sensitive areas, additional cleanup help may be needed from a local fire department. A high pressure fire hose or a high volume flush from a water tanker can remove a majority of the manure solids from the soil surface. This liquid will also need to be collected and removed.

The fourth “C” is to CONTACT THE PROPER AUTHORITIES. This is your legal obligation and should NOT be the last phone call you make. Your immediate attention needs to focus on controlling and containing the spill, but once the incident is under control, contact Wisconsin’s 24-hour Spill Emergency Hotline by calling (800) 943-0003. You will receive guidance and may be directed to additional resources that can assist with the clean up if needed.
The farmer may also be required to report the spill either to the DNR Animal Waste contact (if the farm has a WPDES permit) or to the county Land and Water Conservation Department. You must make sure that the proper authorities are contacted. Your business should either make the call or obtain from the farmer the name and phone number of the person they talked to for your records. Call until you talk to a live person. Leaving only a voicemail is not sufficient.

Throughout the process, DOCUMENT THE SPILL RESPONSE. Keep a detailed record of who you called, what you did and when you did it. If possible, take pictures to document the steps that were taken and to show that you took active role to minimize environmental impacts.

An emergency response plan will help you “plan ahead” so you will be prepared if an incident does occur. A good plan will prepare the person(s) involved in an accident on the appropriate steps to take to respond to the incident at hand. Discuss the plan often with those who you work with update key contact information so everyone will be prepared in case of an accident.

Prevent Manure Runoff
Most farmers carefully manage manure to maximize its value as a fertilizer. Manure improperly spread on farm fields can be carried into lakes, rivers and groundwater by rain or melting snow. So keep your bottom line healthy, and keep Wisconsin lakes, rivers and drinking water clean by taking steps to prevent manure spills and runoff.

Check the Runoff Risk Advisory Forecast
Farmers have a new tool to help them know when it’s risky to spread. Wisconsin’s runoff risk advisory forecast shows what parts of the state are at high risk for runoff based on rainfall, snow-melt, soil conditions, temperatures and weather forecasts. The forecasts are updated three times a day by the National Weather Service at:

http://www.manureadvisorysystem.wi.gov/app/runoffrisk

Follow spreading restrictions if your facility has a water protection permit
If your farm is a Concentrated Animal Feeding Operation, or CAFO, that holds a wastewater discharge permit, you must follow restrictions on when and where you can spread manure. These permits prohibit surface applications of liquid and solid manure on frozen or snow-covered ground during February and March.

What to Do If You Must Empty Your Manure Pit
If you can’t hold off spreading until weather conditions are less risky, there are options for handling your manure while decreasing the chance of runoff.

Contact Your County Land Conservation Agent for Alternatives
Call your county Land Conservation Department or certified agronomist to help identify alternatives to spreading, such as stacking the manure away from fields near lakes or rivers.

If You Must Spread, Identify High Risk Fields and Avoid Them
If you have no alternative to spreading, stay away from fields whose location, slope, and other factors increase the chance that manure will run off them. Avoid spreading on fields that are near drinking water wells or that have sinkholes or exposed bedrock.

View online maps that show which of your fields are more risky to spread on and avoid them:

http://www.manureadvisorysystem.wi.gov/app/applicationmaps
# DNR Spill Coordinator Telephone Numbers

<table>
<thead>
<tr>
<th>Name</th>
<th>Region</th>
<th>Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Hour Hotline</td>
<td></td>
<td>800-943-0003</td>
</tr>
<tr>
<td>Jason Moeller</td>
<td>Northeast</td>
<td>920-662-5492</td>
</tr>
<tr>
<td>John Sager</td>
<td>Northern</td>
<td>715-365-8959</td>
</tr>
<tr>
<td>Mike Schmoller</td>
<td>South Central</td>
<td>608-275-3303</td>
</tr>
<tr>
<td>Scott Ferguson</td>
<td>Southeast</td>
<td>414-263-8685</td>
</tr>
<tr>
<td>Tom Kendzierski</td>
<td>West Central</td>
<td>715-869-1604</td>
</tr>
</tbody>
</table>

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[Map of Wisconsin showing region offices]
Emergency Response Plan

Farm Name: ________________________________

Owner/Operator: ___________________________ Phone: ___________ Cell: ___________

Owner/Operator: ___________________________ Phone: ___________ Cell: ___________

Farm Address: ______________________________

Farm Location: T _____ N, R _____ Ø E Ø W Section _____ County: ___________

Driving Directions or Emergency Coordinates: ________________________________

In Case of Injury, Fire, or Rescue Emergency, Immediately Implement the Following:

1. Assess the condition of the victim, extent of the emergency (fire, rescue) and call for help.
2. Stabilize the victim, use on-site rescue equipment, evacuate buildings, or begin fire suppression as necessary.
3. Brief emergency responders upon arrival on current status of situation.

In Case of a Spill, Leak, or Failure at the Storage Facility, During Transport, or Land Application, Immediately Implement the Following:

1. Stop the source of the leak or spill. For example:
   - Turn off all pumps/valves and clamp hoses or park tractor on hoses to stop the flow of manure.
2. Assess the situation and make appropriate calls for people, equipment, and materials. See contacts below.
   - Notify DNR spill hotline: 1-800-943-0003 (Spill reporting is mandatory by state law.)
   - Call sheriff’s office if spilled on public roads or its right-of-ways for traffic control.
   - Clear the road and roadside of spilled material immediately.
3. Contain the spill and prevent spillage from entering surface waters, tile intakes, or waterways.
   - Use a skid loader or tractor with a blade to build dikes to contain or divert the spill or leak.
   - Insert sleeves around tile intakes (or plug/cap intakes) and block down slope culverts.
   - Use tillage implements to work up the ground ahead of the spill or use absorptive materials.
   - Use pumps to recover liquids.
   - Land apply on approved cropland at appropriate rates.
5. Document your actions.

<table>
<thead>
<tr>
<th>Emergency Contacts</th>
<th>Contact Person (or Company)</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire/Rescue</td>
<td></td>
<td>911 or</td>
</tr>
<tr>
<td>County Sheriff</td>
<td></td>
<td>911 or</td>
</tr>
<tr>
<td>Farm Emergency Coordinator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DNR Hazardous Spill Line</td>
<td></td>
<td>1-800-943-0003</td>
</tr>
<tr>
<td>DNR Permit Contact/Warden</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veterinarian</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equipment/Supplies</th>
<th>Contact Person (or Company)</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-Farm Equipment Operator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excavation Contractor</td>
<td></td>
<td></td>
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<tr>
<td>Manure Hauler</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Septic Tank Pumping Truck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mortality Disposal Contractor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Local Government Contacts</th>
<th>Contact Person (or Company)</th>
<th>Phone Number</th>
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</thead>
<tbody>
<tr>
<td>Town Chairman</td>
<td></td>
<td></td>
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<tr>
<td>LCD County Conservationist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NRCS District Conservationist</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Be prepared to provide the following information:

- Your name and contact information
- Farm address, location and other pertinent identification information.
- Nature of emergency (employee injury, fire, discharge of manure or hazardous materials).
- Emergency equipment and personnel that are needed.
- Potential for manure or hazardous materials to reach surface waters or major field drains.
- Current status of containment efforts.
- Location of hazardous/flammable materials, fire suppression equipment, emergency cut off switches or valves.

April 2007
Key Points:

- All farms should have a nutrient management plan.
- The goal of a nutrient management plan is to combine on farm nutrient sources with commercial fertilizer to meet the crop need while reducing environmental losses.
- Nutrient management plans consist of many parts including: farm narrative, soil conservation plan, manure inventory, nutrient crediting, manure spreading plan, fertilizer spreading plan, soil sample results and maps.
- A custom manure hauler needs to know the rates and locations of applications from the nutrient management plan including receiving a map with restriction and prohibition areas.
- Manure analysis is important from proper nutrient crediting. Professional nutrient applicators may be asked to collect manure samples during spreading.

Notes

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Nutrient management plans are written to:
1. Ensure adequate nutrients for the crop to be grown
2. Reduced the potential for surface and groundwater contamination

What’s in a Plan?
A nutrient management plan is an annual plan that contains the crop rotation, soils information, and nutrient needs for each field. The two items primary items manure applicators need from the plan are:

1. Manure rates to be applied to each field.
2. Maps showing the type and size of setbacks, field boundaries, and the reason for the restriction.

If you do not get a copy of the farm’s nutrient management plan you should consider the following to be the minimum setback requirements:

a. Areas where manure should not be applied any time of year are:
   - Do not apply in established concentrated flow channels (grassed waterways), sinkholes, surface water, non-harvested cropland or buffers.
   - Do not apply within 50 feet of drinking water wells.
   - No applications are allowed on saturated soils.
   - Within 200’ upslope of direct conduits to groundwater (wells, sinkholes, ect.) unless incorporated within 3 days.
   - Do not allow manure to run off the intended application site.
   - Manure should not be applied on fields that exceed the soil’s tolerable soil loss for the crop rotation.

b. Typical winter setbacks are:
   - 300 feet setback from perennial streams Surface Water Quality Management Area (SWQMA)
   - 1,000 feet setback from lake and ponds (SWQMA)
   - 200 feet setback from wells, sinkholes, fractured bedrock at the surface because nutrient applications must be incorporated within 72 hours
   - Do not apply on fields with slopes greater than 9% (12% if contoured) or to fields that have 1/3 or more of their acreage in waterways or concentrated flow
   - Do not exceed 7,000 gallons per acre where you can apply liquid manure.

Left: This diagram shows the setbacks of 300 ft from a perennial stream or river and 1000 ft from a pond or lake relevant to winter manure applications.
c. For all nutrient applications on non-frozen soil within (SWQMA), use at least one of the following practices:
   - Install/maintain permanent vegetative buffers.
   - Maintain greater than 30% crop residue or vegetative cover on the soil surface after nutrient application.
   - Incorporate nutrients within 72 hours leaving adequate residue to meet tolerable soil losses.
   - Establish cover crops promptly following application.

When unincorporated liquid manure applications (less than 12% solids) occur, use Table 1 to determine maximum acceptable rates. No applications are allowed on saturated soils. Sequential applications may be made to meet the desired nutrient additions consistent with the nutrient management plan. Prior to subsequent applications soils shall be evaluated using Table 1 or wait a minimum of 7 days.

### Table 1. Max unincorporated liquid manure application rate with a SWQMA.

<table>
<thead>
<tr>
<th>Surface Texture Class¹</th>
<th>Max Application Rate gal/acre</th>
<th>Allowable Soil Moisture Description for Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine clay, silty clay, silty clay loam, clay loam</td>
<td>3000 5000</td>
<td>Easily ribbons out between fingers, has a slick feel.</td>
</tr>
<tr>
<td>Medium sandy clay, sandy clay loam, loam, silt loam, silt</td>
<td>5000 7500</td>
<td>Forms a ball, is very pliable, slicks readily with clay.</td>
</tr>
<tr>
<td>Coarse loamy sand, sandy loam, sand, peat, and muck</td>
<td>7000 10000</td>
<td>Forms a weak ball, breaks easily.</td>
</tr>
</tbody>
</table>

* Crop residue or vegetative cover on the soil surface after manure application.

**When is a nutrient management plan required?**

Under DNR and DATCP rules, all farmers who mechanically apply manure or commercial fertilizer to cropland (not just livestock operators) must have a nutrient management plan. Nutrients include nitrogen, phosphorus, and potassium from manure, legumes, organic byproducts, and commercial fertilizer. Nutrient applications follow soil test recommendations minus credits from nutrient sources. A nutrient management plan is required when:

- A producer voluntarily accepts, or is offered, government cost-share dollars for nutrient management. State law makes enforcement contingent on an offer of cost sharing for this item only.
- A producer voluntarily accepts, or is offered, government cost-share dollars for the installation of manure storage.
- A producer voluntarily continues participation in the farmland preservation program (FPP).
- A producer is regulated under a county manure storage or livestock siting ordinance.
- A producer is regulated under a DNR Wisconsin pollution discharge elimination system permit (WPDES).

Or if a producer is required to prevent or mitigate imminent harm to waters of the state as an emergency or interim response to a grossly negligent pollution discharge nutrient management planning enforcement can take effect everywhere in Wisconsin after January 1, 2008. However, nutrient management planning enforcement is limited by the availability of cost-share funds and governmental regulation at the state and local levels. Farmers can be compelled to follow a nutrient management plan if 70% cost sharing, of $28/ac to cover 4 years, is offered. Additional cost sharing is not required by a local government for farmers to continue this practice.
Who can write and approve a nutrient management plan?

A qualified nutrient management planner must prepare or approve each nutrient management plan. Persons holding one of the following are presumptively qualified nutrient management planners:

1. Certified as crop consultant by the National Alliance of Independent Crop Consultants (NAICC)
2. Certified as crop advisor (CCA) by the American Society of Agronomy, Wisconsin Certified Crop Advisor Board
3. Certified as a professional agronomist (CPAg) by the American Society of Agronomy
4. Certified as a soil scientist by the Soil Science Society of America
5. A farmer is presumptively qualified to prepare their own nutrient management plan if the farmer has completed a DATCP-approved training course and the instructor approves the first annual plan within the preceding 4 years.

Except in the case of local livestock siting ordinances, where this qualification does not apply.

How can a nutrient management plan be developed?

Nutrient applications based on the field’s soil tests can be calculated manually or by using Snap Plus nutrient management software from http://ww.snapplus.net/ developed by the UW Madison, Soil Science Department and available free of charge. Snap Plus will use the most current UWEX publication A2809 (2006) application rate guidelines. The high end of the N rate guidelines will be the "default" values in Snap-Plus.

This will give the maximum amount of N to apply that is approximately equal to the rate needed to maximize yield. However, users will also be able to adjust their application rate for current economics and select other fertilizer N : corn price ratios to maximize economic return in any specific year.

Will maintaining a nutrient management plan provide liability protection?

Maintaining a nutrient management plan will provide more protection than not having a plan. The nutrient management plan is designed to reduce runoff and ensure adequate annual crop nutrients for each field. In addition, ATCP 50 Wis. Admin. Code presumes a farmer complies with the nutrient management code requirements if the nutrient management plan is prepared or approved by a qualified planner other than the farmer and the farmer follows the plan (effective June 1, 2007).

What if the farmer wants higher rates?

Your responsibility is to follow the written plan. If the farmer is requesting a higher rate, you should contact the person who wrote the plan. This removes the responsibility from you and places it with the trained individual (whom the farmer paid to make rate recommendations).

What if rates are too high for soil conditions?

As plans are often months before you arrive on site, they are not able to take into account weather factors (field freezes before your arrival, early snow, two weeks of rain, etc). As professional manure applicators you have the authority to apply less then what the plan shows. Applications can also be split (½ today, ½ three days from now) if in your judgment, the recommended rate is too high for field conditions. You can always call the plan writer for their advice on the situation as well.
What technical standards and soil test recommendations does Wis. law require for nutrient management planning?

ATCP 50 Wis. Admin. Code requires nutrient management plans to be based on UW Pub. Soil Test Recommendations for Field, Vegetable and Fruit Crops, A2809 (1998) or most current version if preferred by the landowner. ATCP 50 requires nutrient management plans to be based on September 2005 NRCS 590 nutrient management standard and the Conservation Planning Technical Note. Copies of these documents are available at the following web address: http://www.datcp.state.wi.us/arm/agriculture/landwater/conservation/nutrient-mngmt/planning.jsp

The soil test recommendations provided by DATCP certified laboratories are based on the UW Publication A2809 (2006). The major change in these recommendations allows farmers a choice to minimize corn inputs based fertilizer N and corn price ratios appropriate for the operation. Nutrient management planners can still choose the high end of this N range for corn, which is equal to A2809 levels.

What are the manure application restrictions in the 590 standard (2005)?

- No nutrient applications within waterways, non-harvested areas, sinkholes, or nonmetallic mines.
- No nutrient applications within 200 feet upslope of groundwater conduits such as sinkholes, fractured bedrock, tile inlets, non-metallic mines or wells unless incorporated into the soil within 72 hours (except for manure deposited by grazing animals).
- No mechanical manure applications within 50 feet of drinking water wells.
- On frozen or snow covered soils do not apply manure on slopes greater than 9% (12% for contour farming).
- No mechanical manure applications on frozen or snow covered soils within 1000’ of lakes & 300’ of perennial streams.
- On frozen or snow covered soils do not apply manure in excess of 7,000 gallons per acre or the P removal of the next crop, whichever is less.
- Manure applications must comply with supplementary local winter spreading restrictions, if any, spelled out in an individual farm conservation plan agreed upon between the farmer and the county land conservation committee.
- No nutrient applications on fields eroding at rates that exceed tolerable soil loss (T).
- On frozen or snow covered soils do not apply commercial fertilizer except on grass pastures and winter grains.
- On soils likely to leach nitrate nitrogen listed in the WI Conservation Planning Technical Note WI-1, and areas within 1000’ of a municipal well, apply most of the N in the spring. See http://www.snapplus.net/ for soils on the farm, if any, that are susceptible to leaching N.

Is soil erosion control required as part of a nutrient management plan; and can Snap Plus software be used to develop this part of a conservation plan?

Yes. The nutrient management plan must control sheet and rill soil erosion to tolerable levels (T) and provide treatment of ephemeral and gully soil erosion. Sheet and rill soil erosion control can be calculated using Snap Plus software, while ephemeral and gully soil erosion control may require leaving more plant residue or establishing grassed water ways in addition to the Snap Plus calculations. A conservation plan should also try to reduce runoff from winter applied manure by identifying high risk fields and not applying. High risk fields have area where runoff concentrates covering 1/3 or more of the field and could flow to surface water or groundwater conduits.
In what situations can the nutrient management plan deviate from A2809 soil test recommendations?

- When soil or tissue test reveals a specific deficiency or when the 590 standard exempts soil testing as in established fruit crops.
- When excess nutrients are the result of an unforeseen change in the type of crop planted.
- When excess nutrients are the result of manure applications made in the last year prior to implementing the plan.
- When other special agronomic conditions are documented by the planner. A planner who wishes to justify higher applications shall include credible information to show that the higher applications will not materially increase environmental damage.
- When organic N is applied at the removal rate or less of the upcoming year’s legume crop and the P application follows the criteria in the next bullet.
- When manure or an organic byproduct is applied during a crop rotation to meet N soil test recommendations, and P is managed on every field in a tract using either the Soil test P management strategy or the WI P-Index model found in Snap Plus.


- **Soil test P management strategy** – requires fields with 50-100 PPM soil test P to balance P applications with P crop removal over the crop rotation (up to 8 years); and fields with soil tests over 100 PPM P need to apply 25% less than crop removal rates over the crop rotation (up to 8 years).

- **WI P-Index** – requires fields with a WI P Index value of greater than 6 over the crop rotation (up to 8 years) to stop P applications or switch all fields in the tract to the Soil Test P management strategy.

How do I determine the manure nutrient values for a nutrient management plan?

These values must be based on either:

2. Manure analysis conducted at a laboratory that participates in the manure analysis proficiency (MAP) program. Some of these labs are listed below.

Which soil testing laboratories are DATCP certified?

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Phone Number</th>
<th>MAP Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>UW Soil &amp; Plant Analysis Lab–Madison</td>
<td>608-262-4364</td>
<td>(MAP)</td>
</tr>
<tr>
<td>UW Soil &amp; Forage Lab–Marshfield</td>
<td>715-387-2523</td>
<td>(MAP)</td>
</tr>
<tr>
<td>Rock River Laboratory–Watertown</td>
<td>920-261-0446</td>
<td>(MAP)</td>
</tr>
<tr>
<td>Dairyland Laboratories–Arcadia</td>
<td>608-323-2123</td>
<td>(MAP)</td>
</tr>
<tr>
<td>Agsource Soil &amp; Forage Lab–Bonduel</td>
<td>715-758-2178</td>
<td>(MAP)</td>
</tr>
<tr>
<td>A&amp;L Great Lakes Laboratories–Fort Wayne</td>
<td>260-483-4759</td>
<td>(MAP)</td>
</tr>
</tbody>
</table>
Manure Sampling Instructions

Solid manure - Dairy, Beef, Swine, Poultry
Sampling while loading - Recommended method for sampling from a stack or bedded pack. Take at least five samples while loading several spreader loads and combine to form one composite sample. Thoroughly mix the composite sample and take an approximately one pound sub-sample using a one-gallon plastic bag. Sampling directly from a stack or bedded pack is not recommended.

During spreading - Spread tarp in field and catch the manure from one pass. Sample from several locations and create a composite sample. Thoroughly mix composite sample together and take a one pound sub-sample using a one-gallon plastic bag.

Dairy haul - Place a five-gallon pail under the barn cleaner 4-5 times while loading a spreader. Thoroughly mix the composite sample together and take a one pound sub-sample using a one-gallon plastic bag. Repeat sampling 2-3 times over a period of time and test separately to determine variability.

Poultry In-house - Collect ten samples from throughout the house to the depth the litter will be removed. Samples near feeders and waterers may not be indicative of the entire house and sub-samples taken near here should be proportionate to their space occupied in the whole house. Mix the samples well in a five-gallon pail and take one pound sub-sample, place it in a gallon zip-lock bag.

Stockpiled litter - Take ten sub-samples from different locations around the pile at least 18 inches below the surface. Mix in a five-gallon pail and place a one pound composite sample in a gallon zip-lock bag.

Liquid Manure - Dairy, Beef, Swine
From storage - Agitate storage facility thoroughly before sampling. Collect at least five samples from storage facility or during loading using a five-gallon pail. Place sub-sample of the composite sample in a one-quart plastic container. Sampling a liquid manure storage facility without proper agitation (2-4 hrs. minimum) is not recommended.

During application - Place buckets around field to catch manure from spreader or irrigation equipment. Combine and mix samples into one composite sub-sample in a one-quart plastic container.

Sample handling and storage
Solid/Semi-solid samples - Thoroughly mix composite sample and fill one-gallon plastic heavy-duty ziplock bag approximately one-half full. One method of mixing a composite sample is to pile the manure and then shovel from the outside to the inside of the pile until well mixed. Squeeze out excess air, close and seal. Store sample in freezer if not delivered to the lab immediately.

Liquid samples - Thoroughly mix composite sample and fill a one-quart plastic bottle not more than three-quarters full. Using a plunger and an up-and-down action works well for mixing liquid manure in a five-gallon pail. Store sample in freezer if not delivered to the lab immediately.

Sample Identification and Delivery
Identify the sample container with information regarding the farm, animal species and date. This information should also be included on the sample information sheet along with application method, which is important in determining first year availability of nitrogen. To obtain an information sheet please see the submission form page at http://uwlab.soils.wisc.edu/forms.htm. Keep all manure samples frozen until shipped or delivered to a laboratory. Ship early in the week (Mon.-Wed.) and avoid holidays and weekends.
The 590 nutrient management standard contains criteria for surface and groundwater protection that manages the amount and timing of all nutrient sources. These plans are annual and based on soil tests and UW soil fertility recommendations. These plans must credit nitrogen from legumes for the first and second year [A.1.h.], N, P, and K from manure and fertilizer – against the soil test recommendations for the crops to be grown. [A.1.] Available nitrogen from all sources shall not exceed the annual N requirement of non-legume crops consistent with UWEX Publication A2809, or the annual N uptake by legume crops. [A.f.] Annual P and K nutrient recommendations may be combined into a single application that does not exceed the total nutrient recommendation for the rotation except when manure is applied using either the Phosphorus Index, or soil test phosphorus management. [A.d.]

Phrases shown in [brackets] are the location of the requirement in the 590 standard

**What are some of the nutrient application restrictions or setbacks in the 590 standard?**

- **Nutrients shall not be spread on:**
  - Surface water, established concentrated flow channels or non-harvested vegetative buffers, a non-farmed wetland, sinkhole, nonmetallic mine, or well. [A. 2. a.(1.)(2.)]
  - Areas within 50 feet of a drinking water well shall not receive mechanical applications of manure. [A. 2. a.(3.)]
  - Areas contributing runoff within 200 feet up slope of direct conduits to groundwater such as a well, sinkhole, fractured bedrock at the surface, tile inlet or nonmetallic mine unless the nutrients are effectively incorporated within 72 hours. [A. 2. a.(4.)]
  - Land where vegetation is not removed unless necessary in an emergency situation. [A. 2. a.(5.)]
  - Fields eroding more than tolerable soil loss (T) levels over the crop rotation. [A. 2. a.(6.)]

- **When frozen or snow-covered soils prevent effective incorporation at the time of application** and the nutrient application is not prohibited, implement the following:
  - Do not apply nutrients within the 1,000 feet of lakes and ponds or 300 feet of perennial streams (SWQMA) unless manure is deposited through winter gleaning of plant residue. Where winter gleaning occurs, calculate manure nutrients applied and do not exceed the N and P requirements of this standard. [A. 2. b.(1.)]
  - Do not apply nutrients to locally identified areas delineated in an operator signed and land conservation committee approved conservation plan. These areas contribute runoff to surface water or direct conduits to groundwater as a result of runoff. [A. 2. b.(2.)] [Locally identified areas with winter spreading restrictions must be part of an ordinance to protect public health and safety if used for the Livestock Facility Siting Application under ATCP 51, Wis. Admin. Code.]
  - Do not exceed the P removal of the following growing season’s crop when applying manure. Limit liquid manure applications to 7000 gallons per acre. The balance of the crop nutrient requirement may be applied the following spring or summer. [A. 2. b.(3.3)]
  - Do not apply manure on slopes greater than 9%, unless 9% to 12% slopes are contour farmed. [A. 2. b.(4.)]
  - Do not apply N and P in the form of commercial fertilizer except for grass pastures and on winter grains that do not fall within prohibition areas. [A. 2. b.(5.)]

- **Nutrient applications on non-frozen soils in a SWQMA**, use one or more of the following appropriate practices: 1) Install or maintain permanent vegetative buffers. 2) Maintain 30% crop residue or vegetative cover on the soil surface. 3) Incorporate nutrients within 72 hours leaving adequate residue to meet T. 4) Establish fall cover crops promptly following application.
  A. 3. b.(1.)(2.)(3.)(4.)
In addition to the practices above, unincorporated liquid manure (less than 12% solids) applications on non-frozen soils in a SWQMA will use Table 1 to determine maximum acceptable rates. Sequential applications may be made to meet the desired nutrient additions consistent with this standard. Soils shall be evaluated using Table 1 or waiting a minimum of 7 days prior to subsequent applications. [A. 3. a.]

<table>
<thead>
<tr>
<th>Max. Unincorporated Liquid Manure Application Rate within a SWQMA on Unsaturated soils</th>
<th>Allowable Soil Moisture Description for Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent crop residue or vegetative cover on surface after manure applications</td>
<td>&lt;30%*</td>
</tr>
<tr>
<td>Fine soil texture Clay, silty clay, silty clay loam, clay loam</td>
<td>3,000</td>
</tr>
<tr>
<td>Medium soil texture Sandy clay, sandy clay loam, loam, silt loam, silt</td>
<td>5,000</td>
</tr>
<tr>
<td>Coarse soil texture Loamy sand, sandy loam, sand, peat, muck</td>
<td>7,000</td>
</tr>
</tbody>
</table>

Table 1.

More applications may be made to meet the nutrient need as soil conditions become suitable.

♦ **To reduce N losses to groundwater**, restricts the majority of crop N applications to the spring on high permeability soils (sands, etc.), soils with less than 20 inches to bedrock, or soils with less than 12 inches to apparent water table or within 1000’ of a municipal well, apply criteria in section B., if applicable. [B.]

♦ **To reduce P losses to surface water develop a P management strategy**. Where manure, organic byproducts, or fertilizers are applied, avoid building soil test P values when possible beyond the nonresponsive soil test range. [C.1.a.] Establish perennial vegetative cover in all areas of concentrated flow resulting in reoccurring gullies. [C.1.b.] Use either the Phosphorus Index, or soil test phosphorus management strategies when manure or organic by-products are applied during the crop rotation. [C.2.]

Using the **Wisconsin phosphorus index (PI) strategy**, the planned average PI values for up to an 8 year rotation in each field shall be 6 or lower. P applications to fields with planned average PI value greater than 6 may be made only if additional P is needed according to UWEX soil fertility recommendations. [C.2.a.]

Using **soil test phosphorus management strategies**, fields testing from 50-100 ppm soil test P with a P application, shall not exceed total crop P removal for crops to be grown over a maximum of 8 years. Greater than 100 ppm soil test P, eliminate P applications if possible. Or limit applications to 25% less than the cumulative annual crop removal over a maximum of 8 years. For land with potatoes in the rotation, total P applications shall not exceed crop removal over a maximum of 8 years if soil tests are in the optimum, high, or excessively high range for potatoes. Operations using this strategy shall have a certified conservation plan addressing all soil erosion consistent with the current crops and management or use the erosion assessment tools included in the Phosphorus Index model. Where ephemeral erosion is an identified problem, a minimum of one of the following runoff reducing practices shall be implemented: 1) Install/maintain contour strips and/or contour buffer strips. 2) Install/maintain Filter Strips along surface waters and concentrated flow channels that empty into surface waters that are within or adjoin the areas where manure will be applied. 3) Maintain greater than 30% crop residue or vegetative cover on the soil surface after planting. 4) Establish fall cover crops. [C.2.b.]
NUTRIENT MANAGEMENT PLAN CHECKLIST

For Wisconsin’s NRCS 590 (September 2005) Nutrient Management Standard Requirements

County name: ____________________ Date PlanSubmitted: ____________ Growing season year NM plan is written for ____________ Township (T.__N., S.) – (R.__E., W.) Initial Plan or Updated Plan (circle one) (from harvest to harvest)

<table>
<thead>
<tr>
<th>Name of qualified nutrient management planner</th>
<th>Planner’s business name, address, phone:</th>
<th>Cropland Acres (owned &amp; rented)</th>
<th>Name of farmer receiving nutrient management plan:</th>
<th>Circle relevant program requirement or regulation the plan was developed for: Ordinance, USDA, DATCP, DNR, NR 243 – NOD or WPDES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circle the planner’s qualification:</td>
<td></td>
<td>Circle credentials approved by DATCP</td>
<td>Circle credentials approved by DATCP</td>
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</tr>
<tr>
<td>1. NAICC-CPCCC</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2. ASA-CCA</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3. ASA-Professional Agronomist</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. SSSA-Soil Scientist</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. DATCP approved training course</td>
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<tr>
<td>6. Other credentials approved by DATCP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Are the following field features identified on maps or aerial photos in the plan?

   a. Field location, soil survey map unit(s), field boundary, and field identification number

   b. Areas prohibited from receiving nutrient applications: Surface water, established concentrated flow channels with perennial cover, permanent non-harvested vegetative buffer, non-farmed wetlands, sinkholes, lands where established vegetation is not removed, nonmetallic mines, and fields eroding at a rate exceeding tolerable soil loss (T)

   c. Areas within 50 feet of a potable drinking water well where mechanically-applied manure is prohibited

   d. Areas prohibited from receiving winter nutrient applications:

      Slopes > 9% (12% if contour-cropped);

      Surface Water Quality Management Area (SWQMA) defined as land within 1,000 ft of lakes and ponds or within 300 ft of perennial streams draining to these waters, unless manure is deposited through winter gleaning/pasturing of plant residue and not exceeding the N and P requirements of this standard;

      Additional areas identified within a conservation plan as contributing runoff to surface or groundwater

   e. Areas where winter applications are restricted unless effectively incorporated within 72 hours: Land contributing runoff within 200 feet upslope of direct conduits to groundwater such as a well, sinkhole, fractured bedrock at the surface, tile inlet, or nonmetallic mine

   f. Sites vulnerable to N leaching: Areas within 1,000 feet of a municipal well, and soils listed in Appendix 1 of the Conservation Planning Technical Note WI-1

2. Are erosion controls implemented so the crop rotation will not exceed T on fields that receive nutrients according to the conservation plan or WI P Index model?

3. Were soil samples collected and analyzed within the last 4 years according to UW Publication A2100 recommendations?

4. Using the field’s predominant soil series and realistic yield goals, are planned nutrient application rates, timing, and methods of all forms of N, P, and K listed in the plan and consistent with UW Publication A 2809, Soil Test Recommendations for Field, Vegetable and Fruit Crops, and the 590 standard?

5. Do manure production and collection estimates correspond to the acreage needed in the plan? Are manure application rates realistic for the calibrated equipment used?

6. Is a single phosphorus (P) assessment of either the P Index or soil test P management strategy uniformly applied to all fields within a tract?

7. Are areas of concentrated flow, resulting in reoccurring gullies, planned to be protected with perennial vegetative cover?

8. Will nutrient applications on non-frozen soil within the SWQMA comply with the following?

   a. Unincorporated liquid manure on unsaturated soils will be applied according to Table 1 of the 590 standard to minimize runoff

   b. One or more of the following practices will be used: 1) Install/maintain permanent vegetative buffers, or 2) Maintain greater than 30% crop residue or vegetative coverage on the surface after nutrient application, or 3) Incorporate nutrients leaving adequate residue to meet tolerable soil loss, or 4) Establish fall cover crops promptly following application

I certify that the nutrient management plan represented by this checklist complies with Wisconsin’s NRCS 590 nutrient management standard.

Signature of qualified nutrient management planner
Nutrient Management Plans  Lesson 4

Example SNAP-Plus Nutrient Management Plan

SNAP-Plus is a Microsoft Windows® based Nutrient Management Planning software program designed for the preparation of nutrient management plans in accordance with Wisconsin’s Nutrient Management Standard Code 590.

SNAP-Plus will calculate:
- Crop nutrient (N, P$_2$O$_5$, K$_2$O) recommendations for all fields on a farm taking into account legume N and manure nutrient credits consistent with University of Wisconsin recommendations
- A RUSLE2-based soil loss assessment that will allow producers to determine whether fields that receive fertilizer or manure applications meet tolerable soil loss (T) requirements.
- A rotational Phosphorus Index value for all fields as required for using the P Index for phosphorus management.
- A rotational P balance for using soil test P as the criteria for phosphorus management.

SNAP-Plus is free to download at: http://www.snapplus.net/

SNAP-Plus print-outs to insert into the nutrient management include:

Farm Narrative and Crop Report provides the farm name, address, counties of operation and a farm narrative which is used to describe the farm.

Manure Production Estimator Report calculates both solid and liquid manure produced and collected on a farm. Based on animal type, size, and number.

Manure Tracking Report estimates annual manure production and use.

Field Data and 590 Assessment Plan Report serves as the soil conservation plan for nutrient management plans prepared using SNAP-Plus. This report includes the field name, acreage, soil series, slope characteristics, distance to water, contouring, crop rotation, tillage, a tolerable (T) soil loss. This information is used to calculate the average soil loss, Phosphorus Index (PI), and phosphorus balance. Soil loss should be less than Field “T” and the PI should be less than 6. The plan writer can choose to print the Field Data and 590 Assessment Plan together or separately.

Spreading and Nutrient Management Plan by Crop Report lists fields grouped by the crop rotation. For example, corn on corn fields are listed together. The field name, acreage, soil series, crop, yield goal, tillage, and soil test levels are listed. The nutrient recommendations, planned applications, and over/under amounts calculated are reported here.

Field and spreading restriction maps are also an essential component to a nutrient management plan. However, there is no mapping function in SNAP-Plus. Interpreting manure spreading maps is discussed in Lesson 5. As a professional nutrient applicator, a copy of the manure spreading maps and the spreading plan report are what you need from the nutrient management plan.
Snap-Plus Narrative and Crops Report
Starting Year 2012
Reported for Sample farm

Printed 12/19/2012
Plan Completion/Update Date: 12/12/2012

Prepared for
Sample farm
attn: Joe Sample
1234 Blue Valley Skyway
Blue Sky, WI

Farm (or subfarm) has 5 fields totalling 93.0 acres

Farm Narrative:

This is a very small dairy farm with three cropped fields. It is included in Snap-Plus as an example to new users.

No concentrated flow notes available.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alfalfa/Brome</td>
<td>Alfalfa/Brome</td>
<td>Alfalfa/Brome</td>
</tr>
<tr>
<td>02</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>4.6-5.5 ton/Acre</td>
<td>4.6-5.5 ton/Acre</td>
<td>4.6-5.5 ton/Acre</td>
</tr>
<tr>
<td>12</td>
<td>Alfalfa/Brome</td>
<td>Corn silage</td>
<td>Corn silage</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>Fall MB Plow</td>
<td>Fall MB Plow</td>
</tr>
<tr>
<td></td>
<td>4.6-5.5 ton/Acre</td>
<td>21-25 ton/Acre</td>
<td>21-25 ton/Acre</td>
</tr>
<tr>
<td>24</td>
<td>Winter wheat (grain+straw) to Small grain &amp; legume silage</td>
<td>Corn grain</td>
<td>Oats w/ Alfalfa/Brome Seeding Spring</td>
</tr>
<tr>
<td></td>
<td>No Till</td>
<td>Fall Chisel, disked</td>
<td>Spring Chisel, disked</td>
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<tr>
<td></td>
<td>61-80/2-3.5 bu/Acre/ton/Acre</td>
<td>151-170 bu/Acre</td>
<td>61-90 bu/Acre</td>
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<td>3.6-4.5 ton/Acre</td>
<td>3.6-4.5 ton/Acre</td>
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<td>rotational pasture</td>
<td>Pasture, rotationally grazed, grass/legume</td>
<td>Pasture, rotationally grazed, grass/legume</td>
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<td></td>
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<td>3.1-4.0 ton/Acre</td>
<td>3.1-4.0 ton/Acre</td>
<td>3.1-4.0 ton/Acre</td>
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</tbody>
</table>
Snap-Plus Manure Production Estimator Report
For 2013
Reported for Sample farm
Printed 12/19/2012
Plan Completion/Update Date: 12/12/2012

Nutrient Source Summary

<table>
<thead>
<tr>
<th>Source Name</th>
<th>Type</th>
<th>N</th>
<th>N Incorp</th>
<th>P</th>
<th>K</th>
<th>S</th>
<th>Dry Matter</th>
<th>Volume</th>
<th>Volume Applied</th>
<th>Volume Remaining</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
<th>Summer</th>
<th>N</th>
<th>P2O5</th>
<th>K2O</th>
<th>S</th>
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<tbody>
<tr>
<td>Dairy pack slurry</td>
<td>Dairy, solid</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>9</td>
<td>1</td>
<td>30</td>
<td>366</td>
<td>330</td>
<td>36</td>
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<td>Dairy slurry</td>
<td>Dairy, liquid</td>
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<td>10</td>
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<td>15</td>
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<td>Grazing</td>
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<td>Municipal sludge</td>
<td>Biosolid, liquid</td>
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<tr>
<td>Total Solid</td>
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<td>Total Liquid</td>
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</table>

Estimated Livestock Manure Production

<table>
<thead>
<tr>
<th>Animal Type</th>
<th># of animals</th>
<th>Total No. of days</th>
<th>% Collected Solid</th>
<th>% Collected Liquid</th>
<th>Yearly Tons</th>
<th>Yearly Gallons</th>
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<tbody>
<tr>
<td>Dairy Heifer 750 lbs</td>
<td>25</td>
<td>365</td>
<td>75</td>
<td>0</td>
<td>222</td>
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<tr>
<td>Dairy Calf 250 lbs</td>
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<td>365</td>
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<tr>
<td>Dairy Dry Cows 1400 lbs</td>
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<td>Dairy Lactating Cows 1400 lbs</td>
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<td>75</td>
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Manure Storage Pits

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<thead>
<tr>
<th>Pit Name</th>
<th>Volume</th>
<th>Number of Times Emptied per Year</th>
<th>Total Collected Annually</th>
<th>Spreaders</th>
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<tbody>
<tr>
<td>Pit 1</td>
<td>400000 Galls</td>
<td>1</td>
<td>40000 Gallons</td>
<td>Liquid Tank Spreader</td>
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<td></td>
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<td>Liquid</td>
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<td>Gallons</td>
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<td>V Spreader</td>
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<td>5 Tons</td>
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Spreadsers

<table>
<thead>
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<th>Spreader Name</th>
<th>Load Size</th>
<th>Number of Loads per Year</th>
<th>Total Collected Annually</th>
<th>Calibration Date</th>
<th>Calibration Notes</th>
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</thead>
<tbody>
<tr>
<td>Liquid Tank</td>
<td>4000 Gallons</td>
<td>100</td>
<td>40000 Gallons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V Spreader</td>
<td>5 Tons</td>
<td>100</td>
<td>500 Tons</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Farm Totals: 366 Tons = 400000 Gallons

4-12
Snap-Plus Manure Tracking Report
Starting Year 2013
Reported for Sample farm

Printed 12/19/2012
Plan Completion/Update Date: 12/12/2012

Prepared for
Sample farm
attn: Joe Sample
1234 Blue Valley Skyway
Blue Sky, WI

Annual Manure Production and Use by source

<table>
<thead>
<tr>
<th>Source</th>
<th>Production (Tons)</th>
<th>Used (Tons)</th>
<th>Analysis Date</th>
<th>Analysis (N/Nine-P2O5-K2O)</th>
<th>Dry Matter (%)</th>
<th>Total Value (total source volume, incorporated, includes sulphur)</th>
<th>Production (Gallons)</th>
<th>Used (Gallons)</th>
<th>Analysis Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>dairy pack</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$4269</td>
<td>350000</td>
<td>360000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>366</td>
<td>330</td>
<td>3/4-5-9</td>
<td></td>
<td>30</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>Production (Tons)</th>
<th>Used (Tons)</th>
<th>Analysis Date</th>
<th>Analysis (N/Nine-P2O5-K2O)</th>
<th>Dry Matter (%)</th>
<th>Total Value (total source volume, incorporated, includes sulphur)</th>
<th>Production (Gallons)</th>
<th>Used (Gallons)</th>
<th>Analysis Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>dairy slurry</td>
<td></td>
<td></td>
<td></td>
<td>8/10-5-15</td>
<td>6</td>
<td>$6918</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>Production (Tons)</th>
<th>Used (Tons)</th>
<th>Analysis Date</th>
<th>Analysis (N/Nine-P2O5-K2O)</th>
<th>Dry Matter (%)</th>
<th>Total Value (total source volume, incorporated, includes sulphur)</th>
<th>Production (Gallons)</th>
<th>Used (Gallons)</th>
<th>Analysis Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>grazing</td>
<td></td>
<td></td>
<td></td>
<td>3/4-3-7</td>
<td>12</td>
<td>$710</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>municipal sludge</td>
<td></td>
<td></td>
<td></td>
<td>6/9-12-0</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Estimated Livestock Manure Production for 2013

<table>
<thead>
<tr>
<th>Animal Type</th>
<th># of animals</th>
<th>Total No. of days</th>
<th>% Collected as Solid</th>
<th>% Collected as Liquid</th>
<th>Yearly Tons</th>
<th>Yearly Gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy Heifer 750 lbs</td>
<td>25</td>
<td>365</td>
<td>75</td>
<td>0</td>
<td>222</td>
<td>0</td>
</tr>
<tr>
<td>Animal Type</td>
<td># of animals</td>
<td>Total No. of days</td>
<td>% Collected as Solid</td>
<td>% Collected as Liquid</td>
<td>Yearly Tons</td>
<td>Yearly Gallons</td>
</tr>
<tr>
<td>------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
<td>----------------------</td>
<td>-----------------------</td>
<td>-------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Dairy Calf 250 lbs</td>
<td>10</td>
<td>365</td>
<td>100</td>
<td>0</td>
<td>38</td>
<td>0</td>
</tr>
<tr>
<td>Dairy Dry Cows 1400 lbs</td>
<td>10</td>
<td>365</td>
<td>50</td>
<td>0</td>
<td>105</td>
<td>0</td>
</tr>
<tr>
<td>Dairy Lactating Cows 1400 lbs</td>
<td>40</td>
<td>365</td>
<td>0</td>
<td>75</td>
<td>0</td>
<td>350400</td>
</tr>
<tr>
<td>Farm Totals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>366</td>
<td>350400</td>
</tr>
</tbody>
</table>

**Manure Storage Pits for 2013**

<table>
<thead>
<tr>
<th>Pit Name</th>
<th>Volume</th>
<th>Number of Times Emptied per Year</th>
<th>Total Collected Annually</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pit1</td>
<td>400000 Gallons</td>
<td>1</td>
<td>400000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total Pit Tons = 0</td>
<td>Total Pit Gallons = 400000</td>
</tr>
</tbody>
</table>

**Spreaders for 2013**

<table>
<thead>
<tr>
<th>Spreader Name</th>
<th>Load Size</th>
<th>Number of Loads per Year</th>
<th>Total Collected Annually</th>
<th>Calibration Date</th>
<th>Calibration Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid Tank</td>
<td>4000 Gallons</td>
<td>100</td>
<td>400000 Gallons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V Spreader</td>
<td>5 Tons</td>
<td>100</td>
<td>500 Tons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Spreader Spreader</td>
<td>Tons</td>
<td>Total Gallons</td>
<td>Gallons</td>
<td>500</td>
<td>400000</td>
</tr>
</tbody>
</table>
Snap-Plus Field Data and 590 Assessment Plan

Reported for Sample farm

Printed 12/19/2012
Plan Completion/Update Date: 12/12/2012

Field data: 93.0 total acres reported.

| Field Name | Group (sub farm) # | FSA Tract # | FSA Field # | Acres | County | Soil Series & Map Symbol | Field Slope (%) | Field Slope Length (ft.) | Field Slope To Water (%) | N and Field Restrictions | Contour / Filters | Rotation | Tillage | Report Period | Field Avg | Soil Test P ppm | Soil Test Pl ppm | Soil Test Vac | Soil Test Bal ppm | Soil Test Vac | Soil Test P2OS | Soil Test Bal Target | Soil Test P2OS | Soil Test Bal |
|------------|-------------------|-------------|-------------|-------|--------|--------------------------|----------------|--------------------------|--------------------------|---------------------|---------------|----------|---------|----------------|-----------|----------------|----------------|--------------|----------------|---------------|----------------|----------------|----------------|----------------|----------------|
| 02         | 24.0              | WA-Lafayette | Tama (TaB2) | 4     | 250    | 2.1 - 6                  | 1001 - 5000    | -                        | On-contour / no        | AB-AB-AB           | -             | None     | None   | 2012 - 2014 | 5         | 0              | 81              | 193          | 0              | 2012 - 2014 | 5              | 0              |
| 12         | 8.0               | WI-Lafayette | Caraiman (CaA) | 1    | 249    | 0 - 2                    | 0 - 300        | W                       | no / no                | AB-Cs1-Cs1          | -             | None     | None   | 2012 - 2014 | 4         | 1.1            | 20              | -86          | 0              | 2012 - 2014 | 4              | 1.1            | 20            |
| 24         | 24.0              | WI-Lafayette | Ashdale (AsB2) | 4    | 200    | 2.1 - 6                  | 301 - 1000     | -                        | On-contour / no        | [Wwgs+SGLa][-Gc-GpABs] | -             | NT-FCD-SCD | None   | 2012 - 2014 | 4         | 0.5            | 1               | 123          | -65             | 2012 - 2014 | 4              | 0.5            | 1              | 12            | 65            | 44            |
| back field | 22.0              | WI-Lafayette | Ashdale (AsB2) | 4    | 250    | 0 - 2                    | 301 - 1000     | -                        | no / no                | AB-AB-AB           | -             | None     | None   | 2012 - 2014 | 4         | 0.0            | 18              | -75          | -              | 2012 - 2014 | 4              | 0.0            | 18             | -75           |
| rotational | 15.0              | WI-Lafayette | Ashdale (AsB2) | 4    | 280    | 0 - 2                    | 0 - 300        | -                        | no / no                | Prl-Prl-Prl         | -             | None     | None   | 2012 - 2014 | 4         | 0.1            | 19              | -105         | -              | 2012 - 2014 | 4              | 0.1            | 19             | -105          |

Crop Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Crop Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>Alfalfa/Brome</td>
</tr>
<tr>
<td>Cg</td>
<td>Corn grain</td>
</tr>
<tr>
<td>Cs1</td>
<td>Corn silage</td>
</tr>
<tr>
<td>OgABs</td>
<td>Oats w/ Alfalfa/Brome Seeding Spring</td>
</tr>
<tr>
<td>Prl</td>
<td>Pasture, rotationally grazed, grass/legume</td>
</tr>
<tr>
<td>Pu</td>
<td>Pasture (not rotational), unimproved</td>
</tr>
<tr>
<td>Sg7</td>
<td>Soybeans 7-10 inch row</td>
</tr>
</tbody>
</table>

Tillage Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Tillage</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCD</td>
<td>Fall Chisel, disked</td>
</tr>
<tr>
<td>FP</td>
<td>Fall MB Plow</td>
</tr>
<tr>
<td>NT</td>
<td>None</td>
</tr>
<tr>
<td>SCD</td>
<td>Spring Chisel, disked</td>
</tr>
</tbody>
</table>

Restriction Legend

<table>
<thead>
<tr>
<th>Code</th>
<th>Description of Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>High permeability N restricted soils</td>
</tr>
<tr>
<td>R</td>
<td>N restricted soils with less than 20 inches to bedrock</td>
</tr>
<tr>
<td>W</td>
<td>N restricted soils with less than 12 inches to apparent water table</td>
</tr>
<tr>
<td>S</td>
<td>Field in SWQMA</td>
</tr>
<tr>
<td>D</td>
<td>Drinking water well within 50 feet of field.</td>
</tr>
<tr>
<td>C</td>
<td>Conduit to groundwater within 200 feet upslope of field.</td>
</tr>
<tr>
<td>L</td>
<td>Local winter spreading restriction.</td>
</tr>
</tbody>
</table>
Snap-Plus Spreading and Nutrient Management Sorted By Crop
Report
For 2013
Reported for Sample farm
Printed 12/19/2012
Plus Completion/Update Date: 12/13/2012

Prepared for
Sample farm
Attn: Joe Sample
1234 Blue Valley Skyway
Blue Sky, WI

attn: Joe Sample
1234 Blue Valley Skyway
Blue Sky, WI

<p>| Field Name Acres Slope (%) | Soil Series, Map Symbol &amp; N Restriction | Prior Crop | 2013 Crop Yield Goal | P2O5 Crop Removal | K2O Crop Removal | Tillage | Product name and analysis | Application rate and method | N K2O K2O credit | Total Amount | Avg P ppm | Avg K ppm | N lb/ac | P2O5 lb/ac | K2O lb/ac | N lb/ac | P2O5 lb/ac | K2O lb/ac | N lb/ac | P2O5 lb/ac | K2O lb/ac | N lb/ac | P2O5 lb/ac | K2O lb/ac | N lb/ac | P2O5 lb/ac | K2O lb/ac | N lb/ac | P2O5 lb/ac | K2O lb/ac | N lb/ac | P2O5 lb/ac | K2O lb/ac | N lb/ac | P2O5 lb/ac | K2O lb/ac | N lb/ac | P2O5 lb/ac | K2O lb/ac | N lb/ac | P2O5 lb/ac | K2O lb/ac | N lb/ac | P2O5 lb/ac | K2O lb/ac | N lb/ac | P2O5 lb/ac | K2O lb/ac | N lb/ac | P2O5 lb/ac | K2O lb/ac |
|-----------------------------|----------------------------------------|------------|----------------------|-------------------|-------------------|---------|--------------------------|--------------------------------|---------------------------|----------------|----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 02 24.0 4                   | Tama (Tab2)                            | Alfalfa/Brome Alfalfa/Brome | 4.8-5.5           | 65                | 300               | None    | Potassium chloride 0-0-51 | 0-0-92                       | 3600 lbs | 81       | 173   | 0     | 0     | 0     | 0     | 92     | 0     | 0     | 92     |
| back field                  | Ashdale (AsB2)                         | Alfalfa/Brome Alfalfa/Brome | 3.0-4.5           | 50                | 240               | None    | dairy pack 3/4-5-9       | 45-135                         | 330 tons | 18       | 74    | 0     | 50    | 280   | 45    | 75     | 135   | 45    | 25    | -145   |
| 46.9 planned Alfalfa acres  |                                        |            |                     |                   |                  |         |                          |                                |              |            |         |
| 330 planned                 | Tons                                   | dairy pack | applied spring      |                   |                  |         |                          |                                |              |            |         |
| 3600 planned                | lbs                                     | Poassium chloride | applied spring   |                   |                  |         |                          |                                |              |            |         |
| 24 24.0 4                   | Ashdale (AsB2)                         | Corn grain Winter wheat | 151-170           | 90                | 45                | Fall    | Chisel, disked 8/10-8/15 | 15000 gallons/acre Spring | 150-225 | 350000 gallons | 123 | 266 | 170 | 0     | 0     | 150   | 75    | 225   | -20   | 75    | 225    |
| 24.0 planned First Year Corn Grain acres |                                    |            |                     |                   |                  |         |                          |                                |              |            |         |
| 360000 planned              | Gallons                                | dairy slurry | applied spring |                   |                  |         |                          |                                |              |            |         |
| 12 8.0 1                    | Callame (CaW)                          | Alfalfa/Brome Core sl | 21-25             | 80                | 185               | Fall MB | legume 9-23-30            | 800 lbs | 20       | 82    | 185   | 80    | 225   | 199   | 23    | 30    | 14    | -57   | -195   |
| 12                           |                                        |            |                     |                   |                  |         |                          |                                |              |            |         |
| 12                           | Season Note: 2 qt Luma in May 1. Hybris 123. |            |                     |                   |                  |         |                          |                                |              |            |         |
| 8.0 planned First Year Corn Silage acres |                                    |            |                     |                   |                  |         |                          |                                |              |            |         |
| 800 planned                 | lbs                                     | 9-23-30   | applied spring      |                   |                  |         |                          |                                |              |            |         |</p>
<table>
<thead>
<tr>
<th>Other Crops Fields</th>
<th>Applications</th>
<th>Soil Test</th>
<th>Adjusted Recommendations</th>
<th>Planned Applications and Credits</th>
<th>Over (+) Under (-) Adj. UW Recs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td><strong>Acres</strong></td>
<td><strong>Slope (%)</strong></td>
<td><strong>Soil Series, Map Symbol &amp; N Restriction</strong></td>
<td><strong>Prior Crop</strong></td>
<td><strong>2013 Crop</strong></td>
</tr>
<tr>
<td>rotational pasture</td>
<td>15.0</td>
<td>4</td>
<td>Ashdale (AsB2)</td>
<td>Pasture, rotationally grazed, grasslegume grasslegume</td>
<td>45</td>
</tr>
<tr>
<td>15.0 planned Other Crops acres</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Planned to be Applied</th>
</tr>
</thead>
<tbody>
<tr>
<td>330 planned Tons</td>
</tr>
<tr>
<td>360000 planned Gallons</td>
</tr>
<tr>
<td>75 planned Tons</td>
</tr>
<tr>
<td>800 planned lbs</td>
</tr>
<tr>
<td>3600 planned lbs</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Total Manure Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>441 tons</td>
</tr>
<tr>
<td>350000 gallons</td>
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<table>
<thead>
<tr>
<th>Manure App Plan</th>
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<tbody>
<tr>
<td>495</td>
</tr>
<tr>
<td>360000</td>
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</table>

<table>
<thead>
<tr>
<th>Remaining Manure</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
</tr>
<tr>
<td>-10000</td>
</tr>
</tbody>
</table>
Key Points:

- Maps are an essential tool for guiding manure applications.
- Manure management maps can come in a variety of formats. Other formats are acceptable as long as the map is accurate.

Notes

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590 NUTRIENT APPLICATION RESTRICTION MAPS

Manure spreading maps can be obtained from numerous sources. Ideally, the farmer will supply the nutrient applicator with field maps and setbacks from their nutrient management plan. When manure spreading maps are not supplied by the farmer, nutrient applicators can obtain 590 Nutrient Application Restriction Maps from on-line sources such as:

http://www.manureadvisorysystem.wi.gov/

Currently there are three options available. All three options provide the same layers (243 layers in the interactive maps are an exception) to help users meet the requirements in NRCS 590, including: political boundaries, intermittent streams, perennial streams, lakes and ponds, Surface Water Quality Management Areas (SWQMAs), soils (including N-restricted soils and restricted slopes), and an air photo. Prohibition areas such as sites near wells, tile inlets, and sinkholes are not identified by maps generated on this webpage. These features need to be added by a person familiar with local prohibition and restriction features. While online maps are the first starting point, the farm may have additional restrictions imposed as a part of a town ordinance, county ordinance, or WPDES permit. These may include increased setbacks from wells, streams and wetlands, shortened time from application to incorporation, or details on karst features. Always ask the farmer if there are local restrictions in place. If spreading for a WPDES permitted farm, review the restrictions including the permit documentation. Maps may not include all features. Nutrient applicators should be alert for features not listed on the maps, such as neighboring or unused wells, sinkholes, and water resources. http://www.manureadvisorysystem.wi.gov/app/
Interpreting Manure Spreading Maps  Lesson 5

**WI “590” Nutrient Application Restriction Maps & Legend**

On-farm nutrient management begins with a good understanding of field-specific soils and their ability to accept nutrients and manure for optimal crop production while protecting water quality. Nutrient Management Application Restriction Maps show manure and fertilizer restrictions within state rules of the 2005 Wisconsin NRCS 590 Nutrient Management Practice Standard. These maps for the entire state are available, free, on-line, from [http://www.manureadvisorysystem.wi.gov/](http://www.manureadvisorysystem.wi.gov/) for use by planners, producers, and manure applicators to locate Surface Water Quality Management Areas (SWQMAs) for water features, and NRCS soil survey mapping unit boundaries, N and slope restricted soil types.

Each map covers one section (one square mile) and is contained in GeoPDF file format with several layers that users can turn on/off. GeoPDFs allow length and area measurements, notes, polygons, and other markups. To enable these features, download the free toolbar [www.terragaltech.com/download/download.jsp?geo-pdftoolbar](http://www.terragaltech.com/download/download.jsp?geo-pdftoolbar). The maps contain NAP 2005 ortho-photo with updates to 2008 imagery in 2010; PLSS Section Boundary, Roads; 24K Hydrography including Lakes, ponds, perennial & intermittent streams.

**Areas with O** are not standard to these maps and are added by the planner to show wells and groundwater conduits. Nutrient applications are prohibited within 50 feet of potable drinking water wells. Nutrients must be incorporated within 72 hours when applied within 200 feet upslope of sinkholes, gravel and sand pits, wells, tile inlets, surface bedrock, and between 50-200 feet upslope of wells.

**Areas identified in yellow** on these maps are likely to leach N to groundwater. These “N-soils” fit into at least one of the following categories: highly permeable, allowing water to flow downward very quickly, or have less than 20 inches to bedrock have less than 12 inches to the water table or are within 1000 feet of a municipal well. For fields containing N-soils, restrict N applications to the following.

**Fall application of commercial N to these soils is prohibited**, except for establishment of fall-seeded crops, in which case applications may not exceed 30 lbs. of available N/acre. On irrigated fields split N applications, applying the majority of N after crop establishment, or use a nitrification inhibitor with ammonium forms of N.

**Manure-N restrictions:**
- When manure is fall-applied and soil temperatures are higher than 50°F:
  - use a nitrification inhibitor with liquid manure and limit rate to 120 lbs. N/acre, or
  - apply after Sept. 15 and limit rate to 90 lbs. N/acre, or
  - apply to perennial or fall-seeded crops and limit rate to 120 lbs. N/acre or crop N need, whichever is less.

When manure is fall-applied and soil temperatures are lower than 50°F, limit the application rate to 120 lbs. N/acre or the crop’s N need, whichever is less.

The balance of the crop nutrient requirement may be applied the following spring.

**Areas in red** show where winter manure applications are prohibited because slopes are greater than 12%. **Winter** is when soils are frozen, not allowing effective incorporation at the time of application. Soils having slopes between 6-12% are depicted and can have winter manure applications if contour farmed; or if fields are 9% slope or less and not contour farmed in pink and non-pink areas. Where winter applications can occur, do not exceed the P removal of the following growing season’s crop when applying manure. Limit liquid manure applications to 7000 gallons per acre. Do not winter apply commercial N and P fertilizer except for grass pastures and on winter grains that do not fall within prohibition areas. The balance of the crop nutrient requirement may be applied the following spring or summer.

**Areas highlighted in blue cross-hatch** show a Surface Water Quality Management Area or SWQMA where winter mechanical nutrient applications are prohibited. These areas are within 1,000 feet of lakes and ponds or within 300 feet of perennial rivers and streams. Nutrient applications on unfrozen ground in SWQMAs are restricted and must be accompanied by at least one of the following and the liquid manure table if applicable.

1. Establish permanent vegetative buffers
2. Incorporate nutrients within 3 days
3. Maintain greater than 30% residue or vegetative cover
4. Establish cover crops after application

**Max. Unincorporated Liquid (< 12% solids) Manure Application Rate (gal/ac) in a SWQMA on Unsaturated Soils per week**

<table>
<thead>
<tr>
<th>Soil Texture</th>
<th>Percent Crop Residue</th>
<th>Max. Application Rate (gal/ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine soil texture - clay, silty clay, silty clay loam, clay loam</td>
<td>10%</td>
<td>3,000</td>
</tr>
<tr>
<td>Medium soil texture - sandy clay, sandy clay loam, loam, silt loam, silt</td>
<td>30%</td>
<td>5,000</td>
</tr>
<tr>
<td>Coarse soil texture - loamy sand, sandy loam, sand, peat, muck</td>
<td>50%</td>
<td>7,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percent crop residue or vegetative cover on surface manure application</th>
<th>5%</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine soil texture - clay, silty clay, silty clay loam, clay loam</td>
<td>3,000</td>
<td>5,000</td>
</tr>
<tr>
<td>Medium soil texture - sandy clay, sandy clay loam, loam, silt loam, silt</td>
<td>5,000</td>
<td>7,500</td>
</tr>
<tr>
<td>Coarse soil texture - loamy sand, sandy loam, sand, peat, muck</td>
<td>7,000</td>
<td>10,000</td>
</tr>
</tbody>
</table>

5-2
Interpreting Manure Spreading Maps

Lesson 5

WISCONSIN’S RUNOFF RISK ADVISORY FORECAST MAP

The ability to predict the risk of runoff on a particular day can greatly assist Wisconsin producers, manure haulers, and nutrient applicators when making decisions about when to land apply manure or other nutrients. The Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP), United States Geological Survey (USGS), National Oceanic and Atmospheric Administration (NOAA), National Weather Service (NWS), National Resources Conservation Service (NRCS), University of Wisconsin (UW), and others are collaborating to develop the Runoff Risk Advisory Forecast (RRAF), a risk assessment tool that identifies when there is a high likelihood for surface runoff and, therefore, when to avoid spreading nutrients on agricultural fields.

The Runoff Risk Advisory Forecast map currently shows this assessment of day-to-day runoff risk occurring across Wisconsin using NWS forecast models that consider predicted precipitation, soil moisture, snow melt forecasts and actual individual watershed basin characteristics. However, because all of these conditions can and do vary across a watershed basin, persons intending to apply manure or other nutrients should always apply their knowledge of local conditions when deciding whether or not to spread on a specific field. This tool is a work in progress, continuing to be refined as better weather forecasting data and field runoff information becomes available. It is important to note that the RRAF is not a regulatory tool, but rather that it is an aggregate of conditions we can reasonably identify (soil saturation conditions, precipitation, etc.) across the state to help nutrient managers make the best possible decisions.

The forecast map is updated 3 times each day to account for changes in weather forecasts and soil moisture conditions over short time periods. The forecast tool can be found on the Wisconsin Manure Advisory System website link below: http://www.manureadvisorysystem.wi.gov/app/runoffrisk.
Key Points:

- Understand Concentrated Animal Feeding Operations (CAFOs) are large farms that are issued a Wisconsin Pollution Discharge Elimination System (WPDES) permit.
- Recognize CAFOs have manure application and record-keeping requirements that are more stringent than typical 590 nutrient management plans.
- All CAFOs must have a nutrient management plan. Follow it.

Notes

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Concentrated Animal Feeding Operations (CAFOs) are WPDES Permitted Farms (> 1,000 animal units). Wisconsin’s performance standard to prevent or minimize water quality impacts from CAFOs is found in Chapter NR243 of the Wisconsin Administrative Code.

NR 243 - Major requirements

1. Restrictions on applying solid and liquid manure on frozen or snow–covered ground.
2. Requirements for large CAFOs to have six–months worth of liquid manure storage.
4. Provisions for issuing general permits to groups of CAFOs in lieu of individual permits. Adjustments to animal unit equivalency numbers used to calculate which operations are large enough to require a permit.
5. Standard permit requirements for large CAFOs including mortality management, restrictions on chemical disposal in storage or containment facilities, storm water controls and development of an emergency response plan.
6. Manure and process wastewater application restrictions near waterbodies.
7. Allowances for temporary manure stacking in winter.
8. Provisions outlining circumstances under which a CAFO is not responsible for the disposal and land application of its manure and process wastewater.
9. Revised inspection, monitoring and reporting requirements.
10. Permit requirements for small and medium CAFOs.

Other CAFO Details

Size Requirements: In cases strictly based on live weight, 1,000 pounds of live weight is equivalent to one animal unit. From Table 2B in NR243:

- 700 milking and dry dairy cows
- 1,000 heifers (400 to 1200 lbs)
- 1,000 beef steers (400 to Mkt)
- 2,500 swine (55 lbs to market weight)
- 10,000 swine (<55 lbs)
- 82,000 chickens (layers)
- 55,000 turkeys

- Must maintain daily records of manure land application for 5 years.
- Fields that receive manure must meet tolerable soil loss or less.
- Professional nutrient applicators must be aware of specific conditions contained in WPDES permits for a given operation. (These vary from permit to permit and are revised every 5 years.)
- Professional nutrient applicators can be held responsible in instances of negligent application on a case-by-case base.
- Manure spills must be reported to the DNR immediately.
- WPDES requires documentation of periodical inspections and calibration of application equipment.
- Process wastewaters (including milking center wastes, feed storage leachate, some digester wastes), may need to meet different land applications requirements then manure.
- Chemicals may not be disposed of in manure storage or containment structures.
- WPDES permitted farms however are not allowed the 20% adjustment for manure nutrient.
- WPDES permitted farms must specify methods for sampling and analyzing manure.
Other CAFO Details Continued
A permittee who land applies manure or process wastewater shall land apply all manure and process wastewater in compliance with the following requirements:

1. Manure may not pond on the application site.
2. During dry weather conditions, manure may not run off the application site, nor discharge to waters of the state through subsurface drains.
3. Manure may not cause the fecal contamination of water in a well.
4. Manure may not run off the application site nor discharge to waters of the state through subsurface drains due to precipitation or snowmelt except if the permittee has complied with all land application restrictions in this subchapter and the WPDES permit, and the runoff or discharge occurs as a result of a rain event that is equal to or greater than a 25-year, 24-hour rain event.
5. Manure may not be applied to saturated soils.
6. Land application practices shall maximize the use of available nutrients for crop production, prevent delivery of manure and process wastewater to waters of the state, and minimize the loss of nutrients and other contaminants to waters of the state to prevent exceedances of groundwater and surface water quality standards and to prevent impairment of wetland functional values. Practices shall retain land applied manure and process wastewater on the soil where they are applied with minimal movement.
7. Manure may not be applied on areas of a field with a depth to groundwater or bedrock of less than 24 inches.
8. Manure may not be applied within 100 feet of a direct conduit to groundwater.
9. Manure or process wastewater may not be applied within 100 feet of a private well or within 1000 feet of a community well.
10. On a field with soils that are 60 inches thick or less over fractured bedrock, manure may not be applied on frozen ground or where snow is present.
11. Manure may not be applied on fields when snow is actively melting such that water is flowing off the field.
12. Where incorporation of land applied manure is required under NRCS Standard 590, the incorporation shall occur within 48 hours of application.
13. Manure may not be surface applied when precipitation capable of producing runoff is forecast within 24 hours of the time of planned application.

- The depth to bedrock and groundwater needs to be verified.
- Manure is prohibited from entering drain tile and discharging to surface waters. The hauler, farmer, or Certified Crop Advisor (CCA) needs to be identified as the person who identifies and monitors tile lines before during and after manure applications.
- The hauler, farmer, or CCA needs to field and map verify before and during manure applications to ensure all restricted areas/features are identified and avoided.
- When Injecting or immediately incorporating manure, there is a required 25 foot setback from perennial and intermittent streams and conduits such as grassed waterways/ditches.
- Surface applied manure requires a 100 foot setback from perennial and intermittent streams and conduits such as grassed waterways/ditches.
- There is a 25 foot manure required application setback from wetlands.
Revisions to state rules affecting large-scale livestock operations finalized

Large-scale farms with water quality permits affected in effort to prevent manure problems

Wisconsinites all want prosperous farms, good fishing and clean water. The Department of Natural Resources recently completed modifications to water quality regulations affecting large-scale livestock operations, representing an important step in achieving this goal.

The modified rule, NR 243 of the Wisconsin Administrative Code, governs how Wisconsin’s very largest farms manage their manure and seeks to reduce manure-related problems from these farms. Large-scale farms, which have been required since the 1980s to get a state water quality protection permit, have at least 1,000 animal units, equal to 700 milking cows, 1,000 beef steers or 55,000 turkeys. The finalized changes to NR 243 aim to make state rules consistent with federal ones, and to decrease, in particular, winter manure runoff that has contaminated wells, killed fish and polluted streams.

It is important to note that the modified rule only applies to those operations that have been issued a permit by DNR. It is not the DNR’s intent to require permits for all farms with fewer than 1,000 animal units. Instead, the DNR will continue to rely on other programs addressing impacts from these smaller farms and will only issue permits to smaller farms if they fail to address discharges in a timely way or if they contaminate a well.

Changes reflect stakeholders’ coming together

DNR staff met with agricultural and environmental group representatives as well as other state, local and federal agencies, to obtain input and address concerns throughout the NR 243 revision process. After holding a series of public hearings, responding to concerns expressed by state legislative committees dealing with agriculture and obtaining approval from the Natural Resources Board, revisions to NR 243 are now complete. The revisions represent a significant move forward in addressing potential water quality impacts associated with larger-scale livestock operations while ensuring that animal agriculture in the state can continue to grow.

Under the finalized rule, permitted farms are subject to the following provisions:

- Operations would determine if they are at the 1000 animal unit threshold and need a DNR permit by completing a state “combined” animal unit calculation and a federal “individual” calculation.
- Operations proposing to become a CAFO must submit an initial abbreviated permit application 12 months prior to reaching CAFO size and a complete detailed application 6 months prior to reaching CAFO size.
- Farms must properly dispose of animal mortality and develop an emergency response plan to address catastrophic spills.
- Farms must follow nutrient management plans based on applying the right amount of phosphorus, which can otherwise pollute water and fuel algae growth.
- Manure spread on land must be set back from drinking water wells, sinkholes and fractured bedrock. Additional restrictions apply to manure and process wastewater spread on shallow soils over fractured bedrock.
- Revised inspection, monitoring and reporting requirements.
- Farms applying manure near lakes, streams must use practices such as leaving crop residue on fields and reducing application rates to protect against manure runoff, but are allowed flexibility in meeting these requirements.
- Liquid manure can not be spread on frozen or snow-covered ground unless it’s injected, immediately incorporated into soil or unless it’s an emergency outside the operation’s control.
- Solid manure spreading is prohibited on frozen or snow-covered ground during February and March unless immediately incorporated. Farmers can stack solid manure in fields or store it in a designed structure during February and March.
- Six months of liquid manure storage is required with some exceptions. Operations currently without six months of storage have until January 1, 2010, to construct additional storage. Up to 90% of DNR-permitted livestock farms already have, or plan to have, 6 months of storage for liquid manure.

For more information go to:
http://dnr.wi.gov/runoff/rules/nr243/nr243.htm
CAFO Applications within
Surface Water Quality Management Areas (SWQMA)

NOTE: This document generally explains some of the requirements of s. NR 243.14, Wis. Adm. Code, and is for informational purposes only. Please review your WPDES permit and s. NR 243.14 for all applicable requirements.

What is a SWQMA?

For the purposes of ch. NR 243 and WPDES permits issued to CAFOs, SWQMAs include the following areas:

- Areas within 1,000 feet from the ordinary high water mark of navigable waters that consist of a lake, pond or flowage.
- Areas within 1,000 feet from the high water mark of navigable waters that consist of a glacial pothole lake.
- Areas within 300 feet from the ordinary high water mark of navigable waters that consist of a river or stream or other non-lake navigable waters.
- Areas within 300 feet of conduits to navigable waters

SWQMA distances should be measured from the top of the channel for navigable waters and the middle of the channel for conduits to navigable waters.

The first question DNR staff often get is “how do I know a given stream, creek or channel is navigable?” Navigable waters have a defined bottom (bed) and side (bank), and enough water to float any boat, skiff, or canoe of the shallowest draft on a reoccurring basis. Clearly, lakes and perennial rivers and streams are navigable.

But what about those channels that have water in them only occasionally? While it may be a pleasant prospect, using a boat is rarely necessary to tell whether a stream or lake is navigable. Waterways can be presumed navigable if they appear on the USGS topographic map as a perennial lake or stream. Intermittent streams are commonly navigable waterways as well if they appear on a topographic map.

The second question DNR staff often get is “what is a conduit to a navigable water?” For CAFO permits, a conduit to a navigable water means a natural or man-made area or structure that discharges to a navigable water via channelized flow. This includes open tile line intake structures, open vent pipes, sinkholes, agricultural well heads, and drainage ditches that discharge to navigable waters. The main channel of a grassed waterway is also a conduit if it discharges to navigable water. Side grassed waterways that discharge to a main channel of a grassed waterway are not considered direct conduits unless they are essentially two equal channels that end at the start of a main channel of a grassed waterway. Conduits to navigable waters do not include the components of a subsurface drainage system if they are not present at the soil surface.

What restrictions apply to CAFO applications within the SWQMA?

CAFO WPDES permits do not prohibit applications of manure and process wastewater within the SWQMA. However, CAFOs must take additional precautions when applying manure or process wastewater within the SWQMA. One option when applying manure within the SWQMA is to maintain a 100-foot setback from navigable waters and their conduits. CAFO may not apply manure or process wastewater within the setback.

Another option is to implement practices equal to or better than the 100-foot setback. Operations may submit their own equivalent practice for Department approval or follow one of the equivalent practices outlined in NR 243.14(4). These practices include establishing a 35-foot vegetated buffer or a filter strip designed in accordance with NRCS Standard 393 where no manure is applied and:

- Option #1: Inject/immediately incorporate applied materials in the remainder of the SWQMA.
• Option #2: Surface apply materials within the remainder of the SWQMA provided the field has at least 30% residue and follow the application rate restrictions in the table below. On a given field within the SWQMA, additional manure and process wastewater may be applied to meet crop nutrient needs provided at least 7 days have elapsed since the last application.

<table>
<thead>
<tr>
<th>Surface Texture Class</th>
<th>Max Application Rate (gallons/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine</td>
<td>5,000</td>
</tr>
<tr>
<td>Medium</td>
<td>7,500</td>
</tr>
<tr>
<td>Coarse</td>
<td>10,000</td>
</tr>
</tbody>
</table>

**Fine**—clay, silty clay, silty clay loam. **Medium**—sandy clay, sandy clay loam, loam, silt loam, silt. **Coarse**—loamy sand, sandy loam, sand. This category includes peat and muck based on their infiltration capacity.

What SWQMA restrictions apply to wetlands?

For the purposes of implementing nutrient management requirements and WPDES permits, wetlands mean areas delineated on a hydric soils map that are dominated by hydrophytic vegetation. They do not include prior converted or farmed wetlands. When applying manure and process wastewater near wetlands that are connected to and run parallel to navigable waters, the landward edge of the wetland is considered to be the beginning of the SWQMA. Wetland features that are connected to and run perpendicular to that navigable waters are treated as conduits to navigable waters and the SWQMA begins at the landward edge of the wetland. For wetlands that are not connected to navigable waters, manure and process wastewater may not be applied within 25 feet of the wetland.

How does this impact my Nutrient Management Plan?

Nutrient Management Plans (NMP) must outline SWQMA areas on hazard/restriction area maps required as part of NMP submittal. In addition, the NMP narrative and hazard/restriction area maps must identify which practices the operation will be implementing on a field-by-field basis to comply with the SWQMA restrictions. For example, different types or colors of cross-hatching could represent a specific type of practice (e.g., blue cross-hatching represents a 25-foot separation with injection/incorporation, yellow cross-hatching represents a 25-foot separation with a 5,000 gallons/acre application rate.

An operation can also reduce the 100-foot setback to 25 feet on fields that have been in long-term no-till provided they follow option #1 or #2.
CAFO Applications and Phosphorus-based Nutrient Management Plans

NOTE: This document generally explains some of the requirements of s. NR 243.14, Wis. Adm. Code, and is for informational purposes only. Please review your WPDES permit and s. NR 243.14 for all applicable requirements.

Controlling Phosphorus Delivery
NR 243 and WPDES permits issued to CAFOs include a number of requirements to minimize phosphorus (P) delivery to surface waters [see NR 243.14(5)]. Controlling P delivery is based on NRCS Standard 590 and, in most cases, allows operations to use either the Soil Test Phosphorus Strategy or the PI Strategy on a field-by-field basis.

There are areas where WPDES permits require additional practices to minimize P delivery that are more stringent than NRCS Standard 590, primarily by using the P-Index. Whereas NRCS Standard 590 allows operations to not use the P-Index if they plan to only use the Soil Test Phosphorus Strategy, CAFOs are required to use the P-Index in the following circumstances:

- For fields with soil test P levels less than 50 ppm and not at optimum P levels for the highest P demanding crop (according to A2809) that are adjacent to or that the Department determines have a high potential to deliver phosphorus to impaired, outstanding or exceptional resources waters, CAFOs may not increase soil test phosphorus levels over a rotation without Department approval. The Department may approve increases in soil P levels over a rotation up to optimum levels in these fields, if the operation can demonstrate that phosphorus deliverability will not increase due to a rise in soil phosphorus levels. It is assumed that this demonstration will be made via the P-Index.

- For fields with soil test P levels between 100 and 200 ppm, manure and process wastewater applications are limited to 50% of the cumulative annual crop P-need over the rotation or next four years, whichever is less. In addition, the applications may not result in a P-Index value over 6 averaged over the rotation or next four years, whichever is less.

- For fields with soil test P levels of 200 ppm or more, the permittee may not apply manure or process wastewater to these fields without prior Department approval. The Department may only approve applications on these fields if:
  1. Manure and process wastewater applications are limited to 50% of the cumulative annual crop P-need over the rotation or next four years, whichever is less,
  2. The applications do not result in a P-Index value over 6 averaged over the rotation or next four years, whichever is less, and
  3. The P-index increases by less than 1 or applications to the field result in overall decreases in P deliverability to area wetlands or surface waters by reducing applications to fields with higher deliverability.

How does this impact my Nutrient Management Plan?

Nutrient Management Plans (NMP) must outline on a field-by-field basis, the Phosphorus Strategy that the operation is using as well as any relevant calculations where use of the P-Index is required or chosen.
CAFO Applications
When Ground is Frozen, Snow-Covered or Saturated

NOTE: This document generally explains some of the requirements of s. NR 243.14, Wis. Adm. Code, and is for informational purposes only. Please review your WPDES permit and s. NR 243.14 for all applicable requirements.

Properly timing applications of manure and process wastewater

Operations should always recognize the potential increased risk of runoff whenever applying manure on ground that is saturated, frozen, or snow-covered or when rain is forecasted. WPDES permits require that CAFOs time their applications of manure and process wastewater and implement practices designed to avoid potential runoff events associated with these conditions.

Saturated Ground and Predicted Precipitation

CAFOs are prohibited from applying manure and process wastewater to saturated soils, those soils that are so moist as to prevent proper infiltration of applied materials. In addition, manure or process wastewater may not be surface applied when precipitation capable of producing runoff is forecast within 24 hours of the time of the planned application. Permittees should include information on how they plan on addressing forecasted precipitation as part of their Nutrient Management Plan (NMP). [see s. NR 243.14(2)(b)5. and 13.]

Frozen or Snow-Covered Ground

The winter spreading restrictions in s. NR 243.14 are intended to address potential water supply well impacts, fish kills and runoff events. Manure and process wastewater may not be applied when snow is actively melting and water is flowing off of a field. In addition, manure and process wastewater may not be applied on frozen or snow-covered fields with five feet or less of soil to fractured bedrock. [see s. NR 243.14(2)(b)10. and 11.]

Applications of manure that can be properly injected or immediately incorporated do not need to comply with winter spreading restrictions s. NR 243.14(6)-(8). These winter conditions account for reduced runoff potential associated with ephemeral frost and dustings of snow.

Solid Manure [see s. NR 243.14(6)]
Generally, CAFOs may surface apply solid manure on frozen or snow-covered ground except during February and March. Beginning Jan. 1, 2008, CAFOs may not surface apply solid manure during February and March on areas of fields frozen anywhere between the first ½” and 8” of soil or on areas that have 1” or more of snow.

Liquid Manure [see s. NR 243.14(7)]
Except for liquid manure that is frozen and cannot be transferred to storage, CAFOs may not surface apply liquid manure at any time during February and March regardless of soil conditions.

In addition, CAFOs may not surface apply liquid manure during other winter months when the ground is frozen or snow covered, with the following exceptions:

- CAFOs permitted as of July 1, 2007 and CAFOs constructed prior to April 14, 2003, that do not already have 180-days of liquid manure storage, may surface apply liquid manure. These CAFOs have until January 1, 2010, to install six months storage for liquid manure.
- Liquid manure that is frozen and cannot be transferred to storage may be surface applied on frozen or snow-covered ground. [NOTE: as stated above, only this frozen liquid manure may be surface applied during February and March]
- CAFOs permitted as of July 1, 2007 that already have 180-day liquid manure storage and CAFOs that were constructed on or after April 14, 2003, may surface apply liquid manure only on an emergency basis.

Any allowed surface applications of manure must comply with the applicable restrictions and setbacks in NR 243.15(6)-(8) and Tables 4 (solid manure) and 5 (liquid manure). In addition, all surface applications of manure or process wastewater must
meet a winter acute loss index value of 4 or less using the Wisconsin Phosphorus Index. Whenever a permittee surface applies manure or process wastewater on frozen or snow-covered ground, it must inspect the application site during and shortly after the application and report whether any applied materials ran off the application site.

What qualifies as an allowable “emergency application” of liquid manure?

Operations that have 180-day storage, may surface apply liquid manure on an emergency basis provided the following conditions are met:
- The liquid manure storage facility has been properly maintained and operated to provide for 180-days of storage.
- The surface application is necessitated by the exceedance or expected exceedance of the storage facility’s margin of safety.
- The margin of safety exceedance is the result of unavoidable or unforeseen circumstances beyond the control of the permittee, such as unusual weather conditions or equipment failure.
- The permittee follows appropriate notification and reporting requirements regarding the emergency application.

Margin of safety exceedances at operations with 180-day storage that result from the failure of the permittee to properly design or maintain storage capacity do not qualify as the basis for emergency applications allowed as part of a WPDES permit. [see NR 243.14(7)(d)]

What restrictions apply to applications of frozen liquid manure?

Frozen liquid manure that cannot be transported to a manure storage facility may be surface applied on frozen or snow-covered ground in accordance with Table 5. Prohibitions on liquid manure surface applications during February and March do not apply to frozen liquid manure. [see NR 243.14(7)(f)]

What restrictions apply to process wastewater applications on frozen or snow-covered ground?

WPDES permits conditions that regulate the land application of process wastewaters (e.g., milking center wastes, egg wash water) to frozen or snow-covered ground are based on restrictions for industrial wastes contained in ch. NR 214, Wis. Adm. Code. These restrictions include:
- A 500’ setback from inhabited dwelling which may be reduced to 200’ if the wastewater is incorporated and written consent is received from the affected occupants.
- A 1000’ setback from municipal water supplies and 250’ from all other potable water supplies.
- A 200’ setback from surface waters.
- Fields must have a 2% slope or less. The Department may approve applications on fields with up to 6% slopes.
- The maximum hydraulic application loading rate is 6,800 gallons/acre/day.

All other requirements in NR 243 and CAFO WPDES permits (e.g., phosphorus-based nutrient management, application restrictions within the SWQMA) apply to applications of process wastewater. [see s. NR 243.14 for references to process wastewater]

How do restrictions on the timing of manure and process wastewater applications impact my Nutrient Management Plan?

In order to comply with the winter spreading restrictions, CAFOs must create a winter spreading plan that is part of their Nutrient Management Plan (NMP) that addresses the following areas:
- Restriction/hazard area maps for cropped fields showing applicable setbacks and prohibition areas (for example, setbacks in Tables 4 and 5 and fields with 5’ or less of soil over fractured bedrock).
- Identification of an adequate number of fields and acreage that meet the restrictions in Table 4 and 5 as well as allowable application rates on these fields that would result in a winter acute loss index value of 4 or less. Operations with 180-days of liquid manure storage must also identify fields to address potential emergency applications of liquid manure.
- Should a permittee choose to stack solid manure to avoid applications in February and March, the permittee must submit stacking sites for approval as part of the NMP. Stacking criteria and requirements are contained in s. NR 243.141.

In addition, permittees must identify how they plan on identifying storm events capable of producing runoff as part of their NMP.
Restriction Tables from ch. NR 243, Wis. Adm. Code
Table 4—Restrictions for Surface Applying Solid Manure on Frozen and Snow Covered Ground

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Restrictions for fields With 0-6% slopes</th>
<th>Restrictions for fields with slopes &gt; 6% and up to 9%</th>
<th>Restrictions for fields with slopes greater than 9%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required fall tillage practice prior to application</td>
<td>Chisel or moldboard plow, no-till or a department approved equivalent</td>
<td>Chisel or moldboard plow, no-till or department approved equivalent</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Minimum % solids allowed</td>
<td>12%</td>
<td>&gt; 20%</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Application rate (cumulative per acre)</td>
<td>Not to exceed 60 lbs. P2O5 per winter season, the following growing season’s crop P2O5 budget taking into account nutrients already applied, or phosphorus application restrictions specified in a department approved nutrient management plan, whichever is less.</td>
<td>Not to exceed 60 lbs. P2O5 per winter season, the following growing season’s crop P2O5 budget taking into account nutrients already applied, or phosphorus application restrictions specified in a department approved nutrient management plan, whichever is less.</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Setbacks from surface waters</td>
<td>No application allowed within SWQMA</td>
<td>No application allowed within 2.0 x SWQMA</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Setbacks from downslope areas of channelized flow, vegetated buffers, and wetlands</td>
<td>200 feet</td>
<td>400 feet</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Setbacks from direct conduits to groundwater</td>
<td>300 feet</td>
<td>600 feet</td>
<td>Not allowed</td>
</tr>
</tbody>
</table>

A—All tillage and farming practices shall be conducted along the contour in accordance with the following requirements; 0-2% slope = no contouring required, >2-6% slope = tillage and practices conducted along the general contour, >6% slope = tillage and farming practices conducted along the contour. The department may approve alternative tillage practices on a case-by-case basis in situations where conducting practices along the contour is not possible. Allowances for application on no-till fields only apply to fields where no-till practices have been in place for a minimum of 3 years.

Table 5—Frozen and Snow Covered Ground Restrictions—Emergency Surface Applications of Liquid Manure

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Restrictions for fields With 0-2% slopes</th>
<th>Restrictions for fields with &gt; 2% -6% slopes</th>
<th>Restrictions for fields with slopes greater than 6%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required fall tillage practice prior to application</td>
<td>Chisel or moldboard plow or department approved equivalent</td>
<td>Chisel or moldboard plow or department approved equivalent</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Application rate (cumulative per acre)</td>
<td>Maximum application volume of 7,000 gallons per acre per winter season, not to exceed 60 lbs. P2O5, the following growing season’s crop P2O5 budget taking into account nutrients already applied or other phosphorus application restrictions specified in a department approved nutrient management plan, whichever is less</td>
<td>Maximum application volume of 3,500 gallons per acre per winter season, not to exceed 30 lbs P2O5 the following growing season’s crop P2O5 budget taking into account nutrients already applied, or other phosphorus application restrictions specified in a department approved nutrient management plan, whichever is less</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Setbacks from surface waters</td>
<td>No application allowed within SWQMA</td>
<td>No application allowed within SWQMA</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Setbacks from downslope areas of channelized flow, vegetated buffers, wetlands</td>
<td>200 feet</td>
<td>200 feet</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Setbacks from direct conduits to groundwater</td>
<td>300 feet</td>
<td>300 feet</td>
<td>Not allowed</td>
</tr>
</tbody>
</table>

A—All tillage and farming practices shall be conducted along the contour in accordance with the following requirements; 0-2% slope = no contouring required, >2-6% slope = all pitching practices conducted along the general contour. The department may approve alternative tillage practices on a case-by-case basis in situations where conducting practices along the contour is not possible.
BUREAU OF WATERSHED MANAGEMENT
INTERIM GUIDANCE

NUTRIENT MANAGEMENT - CAFO APPLICATIONS ON SHALLOW GROUNDWATER SOILS

March 2009

Description: Ch. NR 243, Wis. Adm. Code, restrictions CAFO manure and process wastewater applications to fields that have less than 24 inches of soil over groundwater or bedrock.

This guidance describes how permittees and their consultants can identify and determine whether to use these fields as well as how Department staff can review fields for compliance with this requirement.

This document is intended solely as guidance, and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. This guidance does not establish or affect legal rights or obligations, and is not finally determinative of any of the issues addressed. This guidance does not create any rights enforceable by any party in litigation with the State of Wisconsin or the Department of Natural Resources. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.
Background
NR 243.14(2)(b)(7) requires CAFO manure or process wastewater applications may not be applied on areas of a field with a depth to groundwater or bedrock of less than 24 inches.

This restriction applies only to those portions of field that have less than 24 inches of separation to groundwater. If portions of a field have at least 24" of soil, these portions of the field are not subject to the prohibition (i.e., there is no diminishment amount of field that falls into/out of a prohibition area that would allow the entire field to be treated to not meet/meet the restriction).

NRCS Conservation Planning Technical Note WI-1
This document (Appendix 1) identifies soils with high potential for groundwater contamination. It places restrictions on ‘w’ type soils. The ‘w’ symbol indicates the soil is very poorly and poorly drained has an apparent water table that is less than 12 inches from the surface for any duration at any time of the year. Accordingly, ‘w’ soils indicate, by definition, where the depth to groundwater may also be within 24 inches of the field surface for any duration at any time of the year.

NRCS Soil Description for ‘w’ soils
NRCS soil descriptions provide more detailed information for individual soils, including ‘w’ soils. Each description contains a category entitled DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY. This category describes the depth to water table (groundwater) for specific time periods. Here are two examples:

Example 1 - Poorly drained. An apparent seasonal high water table is at 15 cm (0.5 foot) above the surface to 31 cm (1.0 foot) below the surface at some time during spring in most years.

Example 2 - Very poorly drained. Depth to the seasonal high water table ranges from 2 foot above the surface in ponded phases to 1 foot below the surface from September to June.

For specific NRCS soil descriptions, use NRCS Soil Description Search link (click on soil series name search): http://soils.usda.gov/technical/classification/osd/index.html

NRCS soil description, groundwater depth factors and NR 243 compliance
The NRCS soil descriptions, however, are not regulatory. They are general guidance provided by NRCS for general nutrient management purposes. The actual depth to groundwater on a specific day or under specific conditions may vary from the NRCS narrative soil descriptions.

The following factors influence groundwater depth:
- Soil type(s) and moisture content.
- Field topography.
- Weather patterns (wet or dry seasons).
- Drainage systems (ditches and drain tiles).
- Crop and Tillage types.

NR 243.14 requires manure applications to fields meet the depth to groundwater requirement on a field by field basis at the time of application. The steps described below provide permitted CAFO farms some methods to demonstrate compliance with the NR243 depth to groundwater requirement. Please note, this guidance does not preclude a CAFO farm from submitting or implementing alternative methods to this guidance*

* = Alternative methods do not become effective until the department has reviewed and approved the method.
Interim guidance for shallow groundwater soils

(1) For each field listed in farm’s Nutrient Management Plan (NMP), identify and map all ‘w’ soil units using tools below. Keep with NMP.
   Tech Note WI-1 (Appx 1)- http://www.wi.nrcs.usda.gov/technical/technotes.html

(2) For each field, document the NRCS Soil Series description for all ‘w’ soil units using link below. Keep with NMP. Use DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY description to determine depth to water table time period(s).
   NRCS Soil Description - http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdname.cgi

(3) If possible, avoid applying manure or process wastewater to areas of fields with ‘w’ soils during shallow groundwater time periods listed in NRCS soil description(s). If avoidance is not possible, follow steps 4-6 below.

(4) Before any application, inspect the ‘w’ soil section(s) of the field and answer the following question: Are ‘w’ soil sections of field ‘idle’ - Y or N?
   For purposes of this guidance, “idle” means: the ‘w’ soil section(s) of field show evidence of hydric soils and exhibit: (1) Wetland vegetation (woody vegetation, shrubs, grasses) or (2) Abandoned condition (e.g., no crops or evidence of recent crops for at least two years).
   i. If Y – no application; locate alternative acreage.
   ii. If N – go to Step 5.

(5) Before any application, demonstrate ‘w’ soil sections of field do not have a groundwater depth of less than 24 inches.
   i. If Y– apply manure and follow all other NR243.14 manure spreading requirements.
   ii. If N– no application; locate alternative acreage; or apply at time when groundwater depth is greater than 24 inches.
   For purposes of this guidance, ‘demonstrate’ means one of the following options:
   (1) Locate drain tile(s) on the field with ‘w’ soils units. Determine drain tile(s) are functioning and tile depth is 24 inches or greater from the surface of the field. If drain tile(s) meet criteria above, complete application and follow all other NR243 spreading requirements (e.g., preventing drain tile discharges to surface waters).
   (2) Excavate at least two “representative” soil pits within at least one ‘w’ soil area on the field that is five acres or less in size* (using mechanical soil auger or manual hand tools) to a depth of at least 30 inches. After at least one hour, observe if the water table is below 24 inches of surface. If both pits (for each five acre area) meet the criteria above, refill each pit, complete application and follow all other NR243 spreading requirements.

   *= When ‘w’ soil area on field is greater than five acres in size, excavate additional soil pits so a ratio of two pits for each 5 acre sized ‘w’ soil unit is met.
   For purposes of this guidance, “representative” means choosing locations within a ‘w’ soil area of field that reflects the overall structure and characteristics of the ‘w’ soil unit.

(6) Document steps taken at each field with ‘w’ soil units in WPDES permit daily and annual spreading reports.
Key Points:

- Become familiar with methods to calibrate liquid and solid manure spreaders.
- Ensure application rates are consistent across the application area.

Notes

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Manure Application
Equipment Calibration

Information on Different Application Methods

The success of a livestock manure nutrient management plan depends on controlled application of manure nutrients to cropland. Calibrating the manure spreader is absolutely essential to obtaining controlled nutrient delivery. Yet many producers regard spreader calibration as unnecessary, inaccurate, or too difficult. The purpose of this article is to outline some of the calibration procedures and to comment on the reliability of the results.

Liquid Spreaders

*What affects the application rate of manure?* Since delivery to the tank discharge is usually by gravity, a full tank applies somewhat more rapidly than a nearly empty tank. Manure solids content will also affect the application rate. Ideally, a spreader calibration should be performed for each manure source to get an idea of how much variability there is between application rates.

*Volume methods.* The simplest method for calibrating a liquid manure spreader is to apply all the manure in a fully loaded spreader and then calculate the field area covered by that load. Divide the spreader volume by the acreage covered to get gallons per acre of application. This is an average rate over the entire load. Some tank spreaders will have an indicator for the manure volume remaining; calibration can then be done over a smaller portion of the load.

To determine the acreage covered, you need to know the width of the swath and the distance traveled. Swath width is the distance between two successive passes of the centerline of the spreader. This center-distance method takes into account any overlap or underlap. One simple way to measure the distance traveled is to mark a wheel and count wheel revolutions during the manure application. (If the tractor cab obscures the view of the rear wheels, a front wheel can be used just as well.) Next multiply the number of revolutions by the distance traveled for each revolution. Use the “Liquid manure in spreader, volume method” equation in the table provided to calculate the gallons per acre applied.

*Weight method.* If scales are available, the spreader can be weighed before and after manure application and the net weight divided by the acreage covered. If you want gallons per acre application rate, you assume an average density (weight per gallon) of the manure. Liquid manure in spreader, weight method assumes a density of about 62 pounds per cubic foot or 8.3 pounds per gallon.

*The rest of the picture.* Liquid spreaders with injection toolbars should be calibrated at more than one ground speed to account for the effects of speed on injector device delivery. Consider calibrating at two or more tractor gear ratios. Keep notes of the results. Remember that over a limited range, manure application rate can be altered by changing ground speed.
Solid and Semisolid Manure Spreaders

Volume method. Box-type spreader manufacturers publish one or more spreader volumetric capacities, one of which is the struck (level-full) capacity, and another the heaped capacity. Be sure to use the right capacity number for the way the spreader is loaded. Spread a full load, noting the distance traveled and swath width, as in the previous “Liquid Spreaders” section. Use the equation in the table, “Solid manure in spreader, spreader volume method” to calculate the tons per acre application rate. The equation assumes a solid manure density of 62 pounds per cubic foot. If there is much bedding in the manure, you may be applying only about 90 percent of the calculated amount because of the reduced manure density.

Sampled weight method. This method samples the application rate by catching manure on one or more plastic sheets placed on the ground in the path of the spreader. Any size rectangular plastic sheet can be used, but there are two or three convenient sizes that make calculation very easy: 9 feet by 12 feet for light application rates, and 56 inches square or 87 inches by 36 inches for heavier rates. If the plastic material comes in 12-foot-wide rolls the first and last sizes listed are very convenient to cut off the roll. Place a plastic sheet in the bucket or tub and weigh the sheet and container for the tare weight. Place the sheet or sheets in the field to get a representative sampling across the width of the spreader swath. Begin spreading well before you reach the plastic sheets and drive the spreader at normal speed over the plastic. Gather up each plastic sheet, place in the bucket or tub, weigh, and subtract the tare weight. For best results, use at least three weights and average them. Note that the weight of manure on the 9 feet by 12 feet sheet is divided by 5 to get the tons per acre. The weight of manure on the smaller “convenience” sizes—87 inches by 36 inches or 56 inches square—requires no conversion at all; the pounds of manure on the sheet equals the tons per acre applied.

The rest of the picture. Calibrate with different spreader settings and different tractor ground speeds to get a range of application rates. You should build a table of rates that will enable you to apply at just about any rate called for in your farm’s manure nutrient management plan.

Reliability and Quality of Calibration Results

Spreader application rates will vary somewhat over sloping ground compared to level ground. Manure consistency, and amounts and type of bedding, will affect application rate as well. Application rate from most spreaders will vary across the swath width, even taking into account an overlap from adjacent rounds. Most equipment delivers a rate that decreases during the application, (the rate is heaviest when the spreader is full.) Until equipment is built that regulates application rate more closely, the burden is on the operator to become familiar with the spreader’s characteristics.

Balancing the uncertainty in the manure nutrient laboratory analysis and sampling error, the soil variability, differences in plant nutrient uptake, and other factors, a reasonable target for calibration precision would seem to be roughly +/- 10 to 20 percent. As with any sampling procedure, a single calibration reading is better than none, but multiple calibrations increase precision. There comes a point of diminishing returns as well, beyond which the labor required to perform the calibration does not pay off in improved precision.
Performance of Manure Injection Systems

The primary objective of manure injection systems is to put the manure under the soil, thereby facilitating better utilization of the nutrients and helping to control odor. A more careful analysis reveals the importance of distributing the manure in the root zone at a sufficient concentration to provide adequate nutrients but not to cause a negative effect on the crop, particularly corn. Another legitimate concern is the potential for environmental problems from leaching into groundwater or drainage into streams. Getting adequate distribution while maintaining sufficient residue cover is essential in conservation tillage applications.

A significant advantage of manure injection is the loosening of the soil with tillage. The objective of tillage is to engage the soil in order to soften and loosen it, creating a better seedbed and root zone. A tilled soil generally has more readily available air, water, and nutrients for plant development. With a manure injection system, the objective of tillage is similar, but the loosening of the soil is primarily to facilitate distribution of manure in the vicinity of the root zone. Removing soil compaction while disposing of waste and thereby getting the benefit of added nutrients is a win-win-win situation.

A potential adverse effect of manure application is soil surface disturbance. Disturbing the surface can significantly cover crop residue in no-till or conservation tillage systems, causing a soil conservation problem. Block et al. (1994 and 1995) have found that soil residue reduction varies significantly with the manure application system (typically 30 to 60 percent reduction), some systems causing unacceptable compliance. A number of factors were noted to influence performance: size and type of tool, speed, depth, tool spacing, soil type, soil condition, and consistency and care of the operator. There is clearly an interdependency of some of these factors, particularly speed, depth, and soil type and condition. The ideal is a system which loosens the soil without overturning it, leaving the surface as undisturbed as possible.

The soil surface may also be left in such a rough condition that a secondary tillage pass is required to smooth it prior to planting. This is more likely to be a problem with manure applied in the spring, since soil roughness acquired in the fall would have a chance to settle during winter and early spring precipitation. Block et al. (1995) measured soil roughness with several manure injection residue levels to remain in conservation systems with application in the fall. Secondary tillage was not necessary prior to planting; however, a heavy spring rain made planting possible by causing significant settling of the soil surface.

The tillage tool, including various attachments, will significantly affect performance with regard to soil surface disturbance and distribution of liquid manure in the soil. The angle, or pitch, of the leading edge, along with the projected area of the tillage tool in the vertical plane transverse to the direction of travel, affect soil disturbance. Sweeps generally cause more of an uplift of soil than chisel points, but result in better distribution of the manure.

The shank width is perhaps the greatest factor influencing residue disturbance and soil roughness. This width is constrained by the necessity of allowing flow of liquid manure without clogging. The shank can often catch residue in a hairpin fashion and result in a plowing effect that adversely affects performance. Putting a coulter in front of the shank, as shown in Figure 4-11, can greatly reduce this effect by cutting through the residue and creating a path for the shank to follow. However, in some cases the residue may be so thick that even the coulter becomes clogged. Closing disks or some other device may help keep soil in a restricted region, preventing some of the coverage of residue.
The speed of the tractor should be adjusted to provide the best performance of the tillage implement. However two other factors come into play: time required to dispose of manure and desired application rate (gal/A). In order to get the desired application rate and operate at a speed for the best performance of the tillage implement, flow control is necessary. Some manure application systems have this feature. Dragline systems which operate with a secondary power unit—such as another tractor—driving the pump allow for control of flow; other systems have attachments with orifice-type restrictions to control flow. Because more precise application rates and calibration will likely be required, future designs should include flow control features that facilitate operators setting their speed and flow rate as desired.

Spacing of the injectors also greatly affects performance. By increasing the spacing, the covering of residue is reduced. But to maintain application rate, flow through the injector units must therefore be increased, resulting in a higher concentration of manure. Optimum distribution is generally obtained by having closer spacing of more injector units. However, using wider sweeps and increasing the spacing can also result in good distribution and relatively less soil surface disturbance. Planting too close to “hot-spots,” or areas with high concentration of liquid manure can have an adverse effect on plant growth. Thus, the distribution associated with sweeps is generally recommended over that of chisel points.

Speed and depth of the tillage tool will greatly influence the degree of soil disturbance. Operators often run at as high a speed as possible to reduce application rate and allow for quick disposal of manure. This can result in significant cover of residue. In addition, operating too shallowly can cause problems with upheaval of soil, particularly with sweep injectors. The angle at which the tool engages the soil does influence these speed and depth effects.

In summary, the performance of the equipment is an important consideration with manure injection systems. Ideally, equipment should distribute manure at desirable application rates without significant soil surface disturbance. Controlling flow rate is a key feature, along with use of a tillage tool or combination of tools that engages the soil to loosen it without significantly disturbing the surface.
**Worksheet 13A-1—Manure Spreader Capacity**

A. Description of spreader.

- **Manufacturer** ____________________________ **Model** ____________________________
- **Type:**  [ ] box  [ ] open-tank  [ ] liquid-tank  
  - **Capacity**: This information is available from your dealer or owner’s manual.
  - **Older models**: bushels x 1.24 = cubic feet
  - **Box or open-tank**: _______ ft³ struck load  _______ ft³ heaped load
  - **Liquid-tank**: _______ gal

B. For open-tank and box spreaders, determine the pounds per cubic foot of manure and the weight capacity of the spreader.

- **Type of manure**:  [ ] solid  [ ] semisolid  

1. Determine manure density using a 5-gallon bucket.  
   - **Trial 1**  **Trial 2**  **Trial 3**
   - a. Empty bucket weight or tare weight
   - b. Bucket filled with manure
   - c. Net weight of manure (b – a)
   - d. Manure density [(c x 3) ÷ 2]
   - e. Average of three trials

2. Weight capacity of the spreader.  
   - **Struck load**  **Heaped load**
   - **Spreader capacity**: _______ ft³  _______ ft³
   - **Manure density**: _______ lb/ft³  _______ lb/ft³
   - **Load weight**: _______ lb  _______ lb
   - **+**: _______ tons  _______ tons

(210-vi-AWMFH, May 1996)
Worksheet 13A-2—Load-Area Calibration

Liquid-Tank Spreaders (Liquid Manure)

1. Determine the capacity of the manure spreader. _______ gal
2. Spread at least three full loads at the desired speed, spreader setting and overlap.
3. Measure the area of the spread.
   a. Spread manure area width _______ ft
   b. Spread manure area length _______ ft
   c. Spread area (a x b) _______ ft²
   d. Spread area in acres (c + 43,560) _______ acres
4. Compute the application rate.
   e. Number of loads spread
   f. Capacity per load _______ gal
   g. Total manure spread (e x f) _______ gal
   h. Application rate (g ÷ d) _______ gal/acre

Box and Open-Tank Spreaders (Solid and Semisolid Manure)

1. Determine the capacity of the manure spreader. _______ tons
2. Spread at least three full loads at the desired speed, spreader setting and overlap.
3. Measure the area of the spread.
   a. Spread manure area width _______ ft
   b. Spread manure area length _______ ft
   c. Spread area (a x b) _______ ft²
   d. Spread area in acres (c + 43,560) _______ acres
4. Compute the application rate.
   e. Number of loads spread
   f. Capacity per load _______ tons
   g. Total manure spread (e x f) _______ tons
   h. Application rate (g ÷ d) _______ tons/acre

Nutrient application = tons/acre x pounds of nutrient per ton
or gallons/acre x pounds of nutrient per gallon
# Calibration

## Lesson 7

### Worksheet 13A-3—Weight-Area Calibration

1. Select a manure collection surface.
   a. Determine collection area
      
      **Ground sheet:**
      
      \[
      \text{width} \, \text{ft} \times \text{length} \, \text{ft} = \text{area} \, \text{ft}^2
      \]
      
      **Pans:**
      
      \[
      \text{pan width} \, \text{inch} \times \text{pan length} \, \text{inch} \div 144 = \text{pan area} \, \text{ft}^2
      \]
      
      \[
      \text{pan area} \, \text{ft}^2 \times \text{number of pans} = \text{collection area} \, \text{ft}^2
      \]

2. Secure ground sheet or pans.

3. Spread manure over the collection area.

<table>
<thead>
<tr>
<th>Forward speed, gear or throttle setting</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
<th>Trial 4</th>
<th>Trial 5</th>
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</thead>
<tbody>
<tr>
<td>PTO speed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spreader setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Collect and weigh the manure and compute the application rate.
   a. Tare weight of sheet or pan
      and weighing container
      
      \[
      \text{lb}
      \]
   b. Gross weight of sheet or pan,
      collected manure and weighing container
      
      \[
      \text{lb}
      \]
   c. Net weight of manure \((b - a)\)
      
      \[
      \text{lb}
      \]
   d. Area of sheet or pans
      
      \[
      \text{ft}^2
      \]
   e. Application rate \((c \div d)\)
      
      \[
      \text{lb/ft}^2
      \]

   Ground sheet or pans to tons per acre.
   f. Application rate \(\left[ (e \times 43,560) \div 2,000 \right]\)
      
      \[
      \text{ton/acre}
      \]

   Pans to gallons per acre.
   g. Tare weight of a 5-gallon bucket
      
      \[
      \text{lb}
      \]
   h. Weight of a 5-gallon bucket full of manure
      
      \[
      \text{lb}
      \]
   i. Net weight of 1 gallon of manure \([(h - g) \div 5]\)
      
      \[
      \text{lb/gal}
      \]
   j. Application rate \(\left[ (e \times 43,560) \div g \right]\)
      
      \[
      \text{gal/acre}
      \]

Nutrient application = tons/acre x pounds of nutrient per ton or gallons/acre x pounds of nutrient per gallon.

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*(210-vi-AWMFH, May 1996)*
Worksheet 13A-4—Uniformity Testing

1. Layout a line of small ground sheet sheets or pans of equal size, equally spaced across two spreader path widths
   a. Determine the pan or sheet area.
      width _______ inch x length _______ inch ÷ 144 = area _______ ft²

2. Spread manure over the collection area.
   Forward speed, gear or throttle setting
   PTO speed
   Spreader setting

<table>
<thead>
<tr>
<th>Area 1</th>
<th>Area 2</th>
<th>Area 3</th>
<th>Area 4</th>
<th>Area 5</th>
<th>Area 6</th>
<th>Area 7</th>
</tr>
</thead>
</table>
   a. Tare weight of sheet or pan and weighing container ______ ______ ______ ______ ______ ______ lb
   b. Gross weight of sheet or pan, collected manure and weighing container ______ ______ ______ ______ ______ ______ lb
   c. Net weight of manure (b – a) ______ ______ ______ ______ ______ ______ lb
   d. Area of sheet or pans ______ ______ ______ ______ ______ ______ ft²
   e. Application rate (c ÷ d) ______ ______ ______ ______ ______ ______ lb/ft²

Uniformity is achieved when all pans or sheets collect the same amount of manure. To improve uniformity, adjust spreader paths to increase or decrease overlap.
**Key Points:**

- Know how to use this quick reference for nutrient and manure information.

**Notes**

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### Soybean Nutrient Recommendations

<table>
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<tr>
<th>Yield Goal</th>
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<th>Low P</th>
<th>Optimum P</th>
<th>High P</th>
<th>Very High P</th>
<th>Ex. High P</th>
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</tbody>
</table>

**Lowest category does not exist for soil test phosphorus.**

### Legume Nutrient Recommendations

#### Alfalfa

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<th>Low P</th>
<th>Optimum P</th>
<th>High P</th>
<th>Very High P</th>
<th>Ex. High P</th>
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<td>115</td>
<td>80</td>
<td>70</td>
<td>60</td>
<td>0</td>
</tr>
<tr>
<td>9.5-10.5</td>
<td>135</td>
<td>125</td>
<td>90</td>
<td>80</td>
<td>70</td>
<td>0</td>
</tr>
</tbody>
</table>

**Lowest category does not exist for soil test phosphorus.**

### Corn Nutrient Recommendations

#### Forage

<table>
<thead>
<tr>
<th>Nitrogen Source</th>
<th>Application Rate (lb/acre)</th>
<th>Pre-Plant</th>
<th>Pre-Emergence</th>
<th>Side-Dress</th>
<th>Post-Emergence</th>
<th>Fertigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea</td>
<td>150</td>
<td>140</td>
<td>130</td>
<td>120</td>
<td>110</td>
<td>100</td>
</tr>
<tr>
<td>Ammonium Nitrate</td>
<td>150</td>
<td>140</td>
<td>130</td>
<td>120</td>
<td>110</td>
<td>100</td>
</tr>
<tr>
<td>Nitrosoammonium</td>
<td>150</td>
<td>140</td>
<td>130</td>
<td>120</td>
<td>110</td>
<td>100</td>
</tr>
</tbody>
</table>

### Alfalfa Nitrogen Credits

- **Alfalfa 1st Year Credit**
  - Good: 100 lb N/acre for 1st year
  - Fair: 160 lb N/acre
  - Poor: 130 lb N/acre

### Green Manure

- **Alfalfa** 100 lb N/acre
- **Sweet Clover** 80 lb N/acre

### Field Crops

- **Soybean** 20 lb N/acre
- **Pea, Snap or Lima bean** 20 lb N/acre

### Corn Nitrogen Guidelines

<table>
<thead>
<tr>
<th>Yield Potential</th>
<th>N-15</th>
<th>N-18</th>
<th>N-21</th>
<th>N-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0.05</td>
<td>0.10</td>
<td>0.14</td>
<td>0.20</td>
</tr>
<tr>
<td>Medium</td>
<td>0.05</td>
<td>0.10</td>
<td>0.14</td>
<td>0.20</td>
</tr>
<tr>
<td>High</td>
<td>0.05</td>
<td>0.10</td>
<td>0.14</td>
<td>0.20</td>
</tr>
</tbody>
</table>

### ALFALFA Nutrient Recommendations

- **Forage:**
  - Where an alfalfa stand is to be maintained for more than three years, increase the annual top-dressed K2O by 20%.
  - Apply 30 lb N/acre in the spring on soils with less than 2% organic matter.

### Alfalfa Crops:

- When barley or oats are seeded with a forage legume, defer N or reduce N for the small grain by 50%.
Key Points:

- Operation of farm equipment on public roads is subject to unique transportation rules.
- Transportation rules can change with the latest legislation.
- 2012 Rule Change: (Except for that portion of I 39 between USH 51 and I 90/94)
  From September 1 to December 31 of each year, no permit shall be required for the transportation of manure to or from a farm in a vehicle or combination of vehicles that exceeds the weight limitations under s. 348.15 by not more than 15 percent and that satisfies any of the following: 1. Has a registered gross weight of 50,000 pounds or more. 2. Is described in s. 340.01 (24) (b). 3. Is an implement of husbandry.

Notes

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Wisconsin Farmers on the Road
Driver requirements
Current as of March 2010

Definition
Farmer: Includes persons who are engaged in those activities specified in the definition of “operation of farm premises” contained in Wisconsin Statutes 102.04(3), provided that such activities are directly or indirectly for the purpose of producing a commodity or commodities for market, or as an accessory to such production. [Wisconsin Statutes 346.01(18)(a)(2)(b)]

Do you need a Class D driver’s license or a CDL?
For driving cars, light trucks and pulling small trailers behind cars and light trucks, a Class D (regular) driver’s license is sufficient. Commercial driver licenses (CDL) are required to operate vehicles that:
» Weigh over 26,000 pounds, determined by the highest of the following weights:
  • manufacturer’s gross vehicle weight rating (GVWR)
  • manufacturer’s gross combination weight rating (GCWR)
  • actual weight
  • registered weight
» Carry hazardous materials that require placarding under federal law.
» Are designed or used to carry 16 or more persons including the driver. (Buses and some school buses.)
However, Wisconsin has exempted farmers from most of the CDL requirements. In Wisconsin, farmers do not need a CDL to operate a CMV on public roads if all three of the following conditions are met:
» They are operating vehicles they own or lease (this does not include vehicles rented for short periods of time);
» They are transporting agricultural products, machinery, or supplies (including hazardous materials) to or from their farm(s), and
» They are operating within 150 miles of their Wisconsin farm(s). The 150 miles includes operation in neighboring states. Currently Wisconsin has agreements with Iowa, Michigan and Minnesota.

NOTE: Some Federal Motor Carrier Safety Regulations may apply if the operation crosses state lines. Refer to www.fmcsa.dot.gov Rules and Regulations or call (608) 267-9162 (Motor Carrier Enforcement Information Service) for more information.

The farmer exemption from CDL does NOT include “for hire” transportation. It only includes operation of farm vehicles for their OWN farm purposes. If farmers wish to operate a CMV “for hire,” or to use a CMV to haul products for others even if no compensation is offered or accepted, they must then have a CDL. Customer harvesters that are also farmers can use the CDL farm waiver for harvesting other farmer’s crops. Customer harvesters that are NOT farmers must have the proper CDL for the CMVs being operated.

Farmers must have a CDL with proper endorsements to operate double or triple trailer vehicle combinations and to operate vehicles designed to carry or actually carrying 16 or more people including the driver.
All persons operating these CMVs on public roads require a CDL—no exemptions are allowed.

The carrying of 16 or more passengers includes carrying passengers in the back of a truck and on farm wagons or trailers. Thus, “hayrides” where 16 or more people are on or in the total of all vehicles, including the power unit, will require the driver to have a CDL.

Medical Certificate: Farmers operating a Class A combination vehicle with a CDL or under the farm exemption must always have a current medical certificate in their possession.

When do you need a driver’s license?
You do not need a driver’s license to temporarily operate or move a farm tractor or implement of husbandry on a highway between fields or between a farm and a field.

An implement of husbandry is defined as
1. A piece of machinery or equipment designed for agricultural purposes,
2. Used exclusively in the conduct of agricultural operations, and
3. Generally used off the highway,
4. This does not include any truck, farm truck, road tractor, truck tractor, farm trailer, trailer-mounted bulk liquid fertilizer tank (includes anhydrous ammonia tanks) or a commercial motor vehicle.

If a vehicle does not meet all four of the above criteria, it may not be driven on public roads by a non-licensed operator. For example, a John Deere 4020 tractor is an implement of husbandry, but a Ford F-150 farm truck is not.

It is illegal to operate an implement of husbandry on public roads for other than agriculturally-related purposes.
Wisconsin Farmers on the Road

Driver requirements

Current as of March 2010

All-terrain vehicles (ATV) and off-road motorcycles are not implements of husbandry, unless specifically registered as such. They are not legal for highway use unless certified by the manufacturer. Therefore, it is illegal to operate ATVs on public roads or public road right-of-ways, except when:

» Specifically registered as implements with the Department of Natural Resources, or
» Operating on designated ATV routes or trails, or
» Crossing the road.

Contact your local police department, sheriff’s office or DNR warden for more information.

Persons younger than 14 may not operate tractors or farm machinery, either on or off-road, for other than their parents’ farm(s).

Persons 14 and 15 years of age, prior to operating tractors or farm machinery for other than their parents, must have completed a Tractor Safety Course and received certification. See the Farmers on the Road: Safety brochure for information on the course and certifications.

Right-of-way

The law does not really give anyone the right-of-way. It only says who must yield it. A driver must do everything possible to avoid a collision. At an intersection without signs to control traffic (an “uncontrolled” intersection), follow these general rules:

When two vehicles approach an uncontrolled crossroads intersection at approximately the same time, the vehicle on the right has the right-of-way.

A vehicle approaching an uncontrolled “T” intersection from the “base” of the “T” must yield to cross traffic.

When a vehicle enters a road from a driveway or field, it must first stop, then yield to any vehicle already on the road.

Livestock on roads

Persons riding animals or driving animal-drawn vehicles on a highway have the same rights and duties as operators of motor vehicles. Be careful not to frighten animals on or near a road. Do not sound your horn or flash your lights when near animals on the roadway and slow down and give the animals plenty of room when passing.

Livestock being driven (herded) over or along any highway have the right-of-way. However, the person in charge of the livestock must try to open the way for traffic.

Driving on the road at slower than normal speeds

Vehicles traveling slower than normal traffic must stay as far to the right-hand side of the roadway as practicable. This does not mean slow vehicles must drive on the shoulder of the road although this is allowed if there is room to do so safely.

If the vehicle is a farm tractor, implement of husbandry, animal-drawn vehicle or other vehicle that is normally operated at speeds below 25 miles per hour, a “Slow Moving Vehicle” (SMV) sign must be displayed on the left rear of the vehicle. In all cases whether the vehicle is considered a SMV or not, if the vehicle is operated during hours of darkness, the front and rear of the vehicle must have lights (white to the front, red to the rear) and the lights must be on. Wisconsin Statutes 347.24 and 347.245
Wisconsin Farmers on the Road
Vehicle registration
Current as of March 2010

Registration and plates

A farm vehicle is exempt from registration, even though operated upon a highway of this state, when it strictly meets this definition.

An implement of husbandry means a vehicle or piece of equipment or machinery designed for agricultural purposes, used exclusively in the conduct of agricultural operations and used principally off a highway, or a trailer-mounted bulk liquid fertilizer container.

"Farmer" includes persons who are engaged in those activities specified in the definition of "operation of farm premises" contained in Wisconsin Statutes 107.04(3), provided that such activities are directly or indirectly for the purpose of producing a commodity or commodities for market, or as an accessory to such production.

"Leased" means that the farmer has entered into a written agreement with a person in the business of leasing vehicles to lease the truck tractor, motor truck, trailer or semi trailer for a period of one year or more.

<table>
<thead>
<tr>
<th>Plate Type</th>
<th>Description</th>
<th>Registration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Tractor</td>
<td>A farm vehicle designed and used primarily as a farm implement for drawing plows, mowing machines and other implements of husbandry.</td>
<td>Exempt from registration if the farm tractor is being used exclusively in agricultural operations, including threshing, or used exclusively to provide power to drive other machinery, or to transport from job to job machinery driven by a farm tractor.</td>
</tr>
<tr>
<td>Dual Purpose Farm Truck</td>
<td>A motor truck owned and operated by a farmer and used for the transportation of supplies, farm equipment and products on the owner's farm or between the owner's farms, the transportation of farm products from the owner's farm to market, and the transportation of supplies to the owner's farm and also used in furtherance of any non-farm occupation, trade, profession or employment.</td>
<td>Registration fees for dual-purpose farm trucks having a registered weight of 12,000 lbs. or less are paid annually. The fee is based on the registered weight to be used as a motor truck. When used in farm operations, the vehicle will be allowed to operate at a maximum gross weight of 12,000 lbs. without the requirement of additional fees. Expire - Annually</td>
</tr>
</tbody>
</table>

If registered as a Farm Truck with a gross weight of less than 38,000 pounds, it may be used for personal and family purposes if the primary use of that motor truck is for purposes specified above, except that a registered farm truck may not be used in furtherance of any non-farm occupation, trade, profession or other employment, including commuting to or from the place of such non-farm occupation, trade, profession or employment. All Farm Trucks with gross weight of more than 38,000 pounds must be used EXCLUSIVELY for farm, personal and family use is not permitted.
## Wisconsin Farmers on the Road

### Vehicle registration

**Current as of March 2010**

<table>
<thead>
<tr>
<th>Plate Type</th>
<th>Description</th>
<th>Registration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Truck</td>
<td>A truck tractor that is owned or leased and operated by a farmer, used exclusively for the transportation of supplies, farm equipment, and products on the owner's farm or between his or her farms. The transportation of farm products from the owner's farm to market, and the transportation of supplies to his or her farm.</td>
<td>Exempt from registration if the farm truck tractor is being operated solely in intrastate transportation and is transporting manure, grains, silage, haylage or equipment between fields or between a farm and a field at the time of operation or is being operated from its point of purchase to the operator's farm.</td>
</tr>
<tr>
<td>Farm Tractor</td>
<td>A truck tractor that is owned or leased and operated by a farmer, used exclusively for the transportation of supplies, farm equipment, and products on the owner's farm or between his or her farms. The transportation of farm products from the owner's farm to market, and the transportation of supplies to his or her farm.</td>
<td>Exempt from registration if the farm trailer is used exclusively for the transportation of farm machinery, implements, produce or supplies on a farm or between farms.</td>
</tr>
<tr>
<td>Farm Trailer</td>
<td>Trailer or semi-trailer with a gross weight greater than 3,000 lbs. which is owned or leased and operated by a farmer and is used exclusively for the transportation of farm products from the owner's farm to market or for the transportation of supplies to the owner's farm.</td>
<td>Exempt from registration if the farm trailer is used exclusively for the transportation of farm machinery, implements, produce or supplies on a farm or between farms.</td>
</tr>
</tbody>
</table>

Wisconsin has entered into a Registration Reciprocity agreement with Minnesota, Iowa, and Michigan, which allows farm operations to operate interstate up to 30 miles into the aforementioned States.

**Note:** All-terrain vehicles, whether used in farm operation or not, are required to be registered with the Wisconsin Department of Natural Resources. [www.dnr.wi.gov](http://www.dnr.wi.gov)

For online information: visit the Wisconsin Department of Transportation [www.dot.wisconsin.gov](http://www.dot.wisconsin.gov)

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This subsection does not apply to transportation by a common motor carrier or contractor motor carrier.
Wisconsin Farmers on the Road
Hazardous materials
Current as of March 2010

You are a "Farmer" according to the Hazardous Materials Regulations (HMR) if you are engaged in the production or raising of crops, poultry or livestock. Many agricultural products used in the course of farming, such as fertilizers, pesticides, and soil amendments, as well as gasoline, diesel fuel, and propane are hazardous materials. If you transport a hazardous material on a public road in the course of your business, the Hazardous Materials Regulations may apply to you.

Legislation
Wisconsin Transportation Order 326 regulates the transportation of hazardous materials within the State of Wisconsin. Trans 326 adopts Parts 107, 171, 172, 173, 177, 178 and 180 of Title 49 of the Federal Hazardous Materials Regulations (HMR). Trans 326.07 states the exclusions to the statutes, allowing many of the exceptions for agricultural products in 173.5 of the HMR.

Hazardous materials regulations
The Hazardous Materials Regulations (HMR) are the rules you must follow if you ship or transport a hazardous material in the course of your business. The HMR tell you:

» How to classify and package a hazardous material;
» How to select the proper packaging;
» How the package must be marked and labeled;
» How to complete a shipping paper;
» How to provide emergency response information that must accompany a hazardous material shipment;
» Whether the vehicle carrying a hazardous material shipment requires placarding and identification of the placards when required;
» About training requirements for persons who transport hazardous materials or prepare hazardous materials for shipment; and
» When a security plan is required for a business that offers hazardous materials and/or transports hazardous materials in commerce.

The HMR and other pertinent information can be accessed through the Pipeline and Hazardous Materials Safety Administration (PHMSA) Hazmat Safety home page at http://hazmat.dot.gov

Agricultural operations exceptions
Wisconsin Transportation Order 326 provides exclusions from the regulations for farming operations when the specific conditions listed in the Transportation Order are met. These exclusions apply to intrastate trips only. Interstate trips are subject to 49 CFR in its entirety.

Transporting between fields (local roads)
If you are a farmer who is an intrastate private motor carrier transporting agricultural products other than gases (Class 2) between fields of the same farm using local roads (other than the Interstate System), Wisconsin law allows you to do so without regulation.

Class 2 material, such as liquefied petroleum gas (LPG) transported as above and meeting the conditions must follow all the requirements other than emergency response information and training, as identified in the appropriate sections of the HMR.

Transporting to or from your farm
When transporting an agricultural product to or from your farm, within 150 miles of the farm, the requirements for emergency response information, training and specific packaging as identified in the HMR do not have to be followed when:

» Transported by a farmer who is an intrastate private motor carrier;
» The product is being transported in a single vehicle;
» The total amount of agricultural product transported on a single vehicle does not exceed:
  » 7,300 kg (16,094 lbs) of ammonium nitrate fertilizer properly classes as Division 5.1, PG III, in a bulk packaging, or 1900 L (502 gallons) for liquids or gases, or 2,300 kg (5,070 lbs) for solids, of any other agricultural product.
Wisconsin Farmers on the Road
Hazardous materials
Current as of March 2010

Additional exceptions relating to agricultural operations
Sections referenced for the following exceptions are listed in the HMR. These additional exceptions pertain to:

» A private motor carrier transporting formulated liquid agricultural products in specification packages of 220 L (58 gal) capacity, or less, with closures manifolded to a closed mixing system and equipped with positive dry disconnect devices between a final distribution and an ultimate point of application or for loading aboard an airplane for aerial application (See Federal HMR 173.3(m))
» Nurse tanks of anhydrous ammonia (See Federal HMR173.315(m))
» Materials of trade (See Federal HMR 173.6).

Disposal of used oil filters
The EPA does not classify used oils destined for recycling as hazardous waste. However, Wisconsin does not allow used oil in landfills. Used oil must be recycled either by burning it on-site for heat recovery or by hauling it off-site to be recycled into a fuel or a new lubricant base stock. The EPA classifies used oil filters from light-duty vehicles (car and small pick-ups) as solid waste exempt from hazardous waste requirements, provided the filters are drained.

Many used oil filters from heavy-duty trucks are_termi-plated (termite is an alloy of tin and lead) and the EPA concludes they may exhibit toxicity for lead. Such filters must be evaluated for hazardous waste characteristics. If, after testing, the filters do not exhibit hazardous waste characteristics, they may be disposed of in the same manner as light duty oil filters.

Pesticide transportation
Pesticides are regulated by Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) and the Federal Environmental Protection Agency. Pesticides are classified as either general or restricted use. Restricted use pesticides (RUP) are prominently labeled to indicate they are only for sale to or for use by certified applicators. Farmers who use RUP products must be certified as a private applicator and need to carry their certification with them. Regardless of use classification, pesticides being transported must be secured, adequately separated from food or feed products and may not be transported in broken, defective or improperly sealed containers. Pesticides also must be in the original containers. All containers must be properly labeled, and transported according to any further restrictions on the label. If an accidental spill occurs, you shall report it to the State Spills Hotline, and a DATCP field person will respond to the spill.

Some pesticides may require placards. Most soil fumigants fall into that category, as do some other highly toxic products. Check the label of the pesticide to see if placards are required. A color guide to HM marking, labeling and placarding is available from Pipeline and Hazardous Materials Safety Administration (PHMSA). For other questions on pesticide transportation or labeling requirements, contact DATCP at (608) 224-6500.

Class 2.3 – Poisonous gas
Poisonous gas packages must be marked Inhalation Hazard. Any vehicle, tank or container that contains Inhalation Hazard material must be placarded on each side and end with a Poison or Poison Gas placard.

Exception: Anhydrous ammonia, transported within the U.S. is treated differently. Bulk packages must be marked Inhalation Hazard on two opposing sides. Poison placarding is not required. However, the non-flammable gas placard must be displayed.
Using placards to communicate hazards

Placards required by the HMR provide first-on-scene emergency responders with a quick way to assess the hazards associated with the material that is being transported. Placards provide the means for emergency responders to identify the threat and safely and appropriately handle the accident, conduct lifesaving operations, and mitigate the threat of environmental damage. The chart lists examples of placards that identify hazardous materials such as pesticides, fertilizers such as anhydrous ammonia or ammonium nitrate, fuels such as gasoline, diesel, and propane; and explosives such as dynamite and detonators, which are often used in the agriculture business.

<table>
<thead>
<tr>
<th>Material</th>
<th>Placard</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamite (Division 1.1 explosive)</td>
<td>Explosives 1</td>
<td>Any amount</td>
</tr>
<tr>
<td>Detonators (Division 1.4 explosives)</td>
<td>Explosives 1.4</td>
<td></td>
</tr>
<tr>
<td>Propane (Division 2.1 materials)</td>
<td>Propane 2</td>
<td>454 kg/1001 lbs or more aggregate gross weight of non-bulk containers or bulk containers (Capacity of more than 450 liters/119 gallons, or more than 400 kg/882 lbs, regardless of volume or weight of contents)</td>
</tr>
<tr>
<td>Anhydrous ammonia (Division 2.2 with inhalation hazard)</td>
<td>Anhydrous Ammonia 3</td>
<td></td>
</tr>
<tr>
<td>Gasoline (Class 3)</td>
<td>Gasoline 3</td>
<td></td>
</tr>
<tr>
<td>Diesel fuel (Class 3)</td>
<td>Flammable</td>
<td></td>
</tr>
<tr>
<td>Pesticides/herbicides that bear a DOT poison label (Division 6.1)</td>
<td>Pesticide Herbicide (Poison 6)</td>
<td></td>
</tr>
<tr>
<td>Ammonium Nitrate (Division 5.1)</td>
<td>Oxidizer 5.1</td>
<td></td>
</tr>
</tbody>
</table>
Wisconsin Farmers on the Road
Hazardous materials
Current as of March 2010

In case of accident
Whenever a hazardous material is spilled, contact your local authorities immediately. The spill must also be reported to the State Spills Hotline.

WISDOT Emergency Number: (800) 424-8802
Wisconsin State Spills Hotline: (800) 943-0003

The Wisconsin Department of Natural Resources allows very small quantity generators of hazardous waste (less than 220 lb. per month) to self-transport their hazardous waste to a licensed hazardous waste disposal facility. In this case, the transporter is not required to have a State of Wisconsin solid or hazardous waste transportation license.

The Department of Commerce, Safety and Buildings Division has minimum requirements for design, construction, location, installation, operation, repair and maintenance of anhydrous ammonia and gas systems which include liquefied petroleum gas, liquefied natural gas, compressed natural gas and liquid or gaseous hydrogen.

The Wisconsin Department of Agriculture, Trade and Consumer Protection (608) 224-4500 has requirements for the labeling, transportation, storage and handling of pesticides.

For further information

Wisconsin Department of Natural Resources
Bureau of Waste and Material Management
P. O. Box 7921
Madison, WI 53707-7921
Phone: (608) 266-2111

Federal Motor Carrier Safety Administration (FMCSA)
One Point Place, Suite 101
Madison, WI 53719
http://www.fmcsa.dot.gov
Phone: (608) 662-2010

Wisconsin State Patrol
Motor Carrier Information System
Phone: (608) 267-5762

Pipeline and Hazardous Materials Safety Administration (PHMSA)
http://PHMSA.dot.gov/hazmat
Info Line: (800) 467-4922
E-mail: infoctr@phmsa.dot.gov

Wisconsin Motor Carriers Association
562 Grand Canyon Drive
Madison, WI 53744-4849
Phone: (608) 833-8200
FAX: (608) 833-2875
www.wittruck.org

For information about HM publications and training materials, write:
Office of Hazardous Materials Initiatives and Training
400 Seventh Street, SW
PHH-50, Rm 2424
Washington, DC 20590-0001
FAX: (202) 366-2301
E-mail: training@DOT.gov
Phone: (202) 366-2301
Wisconsin Farmers on the Road Safety
Current as of March 2010

Hazardous material

Every motor vehicle containing hazardous material must be driven and parked in compliance with laws, ordinances and regulations of the jurisdiction in which it is being operated or the Wisconsin Department of Transportation (WisDOT) laws, whichever is most strict.

Whenever there is unintentional release of a hazardous material during transportation or temporary storage or incidents such as a spill, accident or fire occurs during the transportation of hazardous materials, the carrier is required to report the incident to WisDOT.

In case of an accident, call Chemical Transportation Emergency Center (Chemtrec). (800) 424-9300 which is available 24 hours a day for assistance. Advice will be provided to those at the scene of the incident and Chemtrec will promptly contact the shipper of the chemicals involved for more detailed assistance and appropriate follow-up.

A bill of lading, shipping paper or invoice must be carried at all times for any hazardous materials being transported. This document must thoroughly describe the material and must be readily available to and recognizable by authorities in the event of an incident or inspection. The hazardous material must be on a bill by itself or, if part of a mixed load, it must be highlighted by distinguishable color, tabbed or must appear first in any group of papers. The paper must always be within the normal reach of the driver. If the driver must leave the vehicle, the shipping paper documents must be left upon the driver’s seat or in a holder mounted on the driver’s door.

Equipment

No person may operate on a highway at any time any vehicle, equipment or machinery (including animal-drawn vehicles) which usually travels at speeds less than 25 miles per hour, unless there is displayed on the most practicable visible rear area of the vehicle or combination of vehicles a Slow Moving Vehicle (SMV) emblem or yellow/amber flashing light.

No person shall operate or park a farm tractor or other self-propelled farm implements upon the highway during hours of darkness unless the vehicle is displaying lighted parking lamps as required by other vehicles under similar circumstances. All towed vehicles must display a minimum of one reflective SMV emblem or red lamp visible from a distance of 50 feet from each side of the vehicle.

Non-registered farm implements should be securely coupled to the towing vehicle. Pins attaching towed vehicles must be safely secured. All other vehicles must be coupled by means of safety chains, leveling bars or cables. There shall be only enough slack in these systems to permit the proper turning of the units while still preventing the coupling device from dropping to the ground, should a disconnection occur. No person shall operate a vehicle on the highway unless it is constructed and loaded as to prevent its contents from dropping, shifting, leaking or otherwise escaping from the vehicle.

There is no tarp requirement in Wisconsin Statutes, although local ordinances may require tarps.

Federal regulations

All vehicles with a Gross Vehicle Weight Rating (GVWR) or actual weight over 10,000 pounds are subject to the Federal Motor Carrier Safety Regulations (FMCSRs) on equipment and lighting, regardless of whether the unit is traveling within Wisconsin or going out-of-state. Farmers are not exempt from these rules. Contact Wisconsin State Patrol Motor Carrier Enforcement Information System at (608) 267-9762 if you have specific questions.

If you are operating an articulated (combination) motor vehicle over 10,000 pounds GVWR and are operating out-of-state, you must have proof of a current medical certificate in your possession. If the trip is over 100 air miles one way, you must also have a current record of duty status.

If you operate any vehicle or combination of vehicles over 26,000 pounds GVWR within Wisconsin, you must possess a current medical certificate. If your trip is in excess of 100 air miles one way, you must also have a current record of duty status.

Tractor safety

Farm tractors and other machinery sometimes need to be operated on public roads for short distances. It is important to remember these units are not designed for on-road operation and thus generate potential dangers. All precautions and due regard must be used for any and all on-road operations. While some operators may not have valid driver’s license and limited knowledge of all traffic laws, it is imperative they be made aware of the need to operate in a safe manner. Safety First must be the rule applied during all times of operation.
Wisconsin Farmers on the Road Safety
Current as of March 2010

Tractor and machinery training and certification program

Several formal classroom and on-tractor safety training programs are available through the University of Wisconsin Extension and vocational schools. These programs vary from 10–25 hours depending on the skills being taught. Upon successful completion, a certificate is granted that allows persons 14 to 15 to operate tractors and farm equipment for other farm operations other than their parents’ farm(s). WisDOT strongly recommends the attendance of these training courses for all youth and adult farm vehicle operators. The programs are designed to teach the basics of safe and responsible tractor and machinery operation.

Contact your local UW-Extension Office at www.uwex.edu or (800) 442-6459 for more information.

Tractor and machinery safety programs are offered throughout the state. Videos teaching tractor and machinery safety are also available from your local UW Extension agent.

Parking on highways

You may not park any vehicle on the roadway when it is possible to park off the roadway. You may park it in the right-of-way, off the roadway, IF:

- You leave at least 15 feet of unobstructed roadway, and
- Your parked vehicle is visible to other drivers from a distance of at least 500 feet in either direction
Wisconsin Farmers on the Road
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Length limits
The length limit for a single vehicle and load is 40 feet. For a combination of two vehicles, the length limit is 65 feet.

There is no length limitation for implements of husbandry when they are temporarily operated upon a highway. An implement of husbandry is defined as a piece of machinery or equipment designed for agricultural purposes, used exclusively in the conduct of agricultural operations and generally used off the highway. This does not include any truck or truck tractor that meets the definition of a commercial motor vehicle. Two trailers used primarily as implements of husbandry, or one such trailer and any other implement of husbandry, may be pulled by a farm tractor if the overall length does not exceed 60 feet and if the operation is strictly a farming operation.

Two trailers transporting empty pressurized or non-pressurized tanks used for hauling or storing liquid agricultural fertilizer, or two implements of husbandry including two empty trailers used primarily as implements of husbandry in connection with seasonal agricultural activities, may be drawn by a truck or truck tractor without a special permit as long as the overall length of the combination of vehicles and load does not exceed 60 feet.

Under no circumstances are more than two implements of husbandry allowed to be pulled by any vehicle at one time upon a highway.

Loads shall not extend more than 3 feet beyond the front bumper, or more than 4 feet beyond the rear bumper without special markings.

Width limits
There are no limitations on width for implements of husbandry temporarily operated upon a highway in the performance of its work [Wisconsin Statutes 348.05(2)(a)]. A farm tractor is allowed 9 feet in width when operated on the Interstate system and 12 feet on all other roads. Loads of hay in bales may not exceed 12 feet in width. The total outside width of the load may not exceed the width of a single traffic lane. This hay width provision does not apply on an Interstate highway.

Farm tractors exceeding 12 feet in width and all other farm machinery and implements of husbandry exceeding 8 feet 6 inches in width not being operated in the course of performance of its work may be moved, towed or hauled over the highways without special permit between one-half hour before sunrise and sunset on Mondays to Thursdays and from one-half hour before sunrise to 2 on Fridays. Such overload machinery shall not be moved on any Wisconsin highway that is part of the Interstate highway system without special permit [Wisconsin Statutes 348.05(3)].

No person, without a special permit, shall operate on a highway any motor vehicle or trailer carrying any load extending beyond the left fender line, or extending more than 6 inches beyond the right fender line.

Also see Form SP4415 Motor Vehicle Size Regulation Summary.

Weight limits
Farmers are not exempt from weight laws.

Weight limits depend on factors such as the number of axles, axle spacing, class of highway and type of product carried. All wheels of a vehicle imposing weight upon the highway, extending across the full width of the vehicle and load, are weighed.

A maximum of 20,000 lbs. is allowed on a single axle; 34,000 lbs. on a tandem axle; and 13,000 lbs. on the steering axle of a truck tractor-trailer combination. The total gross weight may never exceed 80,000 lbs. without a special permit or seasonal allowance. The weights listed above are Class “A” highway limits. Class “B” highway maximum weights are 60% of these weights. Class “B” highways will be posted as such, while Class “A” highways are not posted. Some counties and townships often post selected roads and bridges for lesser weight limits, and these are enforced as posted.

One or more axles can be added to a truck or trailer that can be raised or lowered depending on the weight of the load. These added axles are called
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“air” or “tag” axles. To count as an axle, each “air” axle must carry a minimum of 8% of the total gross weight of the vehicle and its load. Axle spacing is measured from the center of the axle to the center of the next axle and is rounded off to the nearest foot.

If a vehicle or combination of vehicles is transporting exclusively livestock, the weight allowance for any single axle or group of axles is increased by 15% as long as the total gross weight does not exceed the maximum allowed for that vehicle. In no case is more than 80,000 lbs. allowed. Also see Farm SP 4416 Raw Forest and Agricultural Products Weight Limitations Chart.

Oversize loads

Because of oversize variables and complicated laws, if you need information on the general provisions and regulations relating to permits for vehicles and loads of excessive size and weight, you may check on-line or refer to the following:

Questions on oversize loads? E-mail oversize-permits.dmv@dot.state.wi.us or call (608) 266-7320. For more information, see www.dot.wisconsin.gov/statepatrol/inspection/size-weight.

Securing the load

No person shall operate a vehicle on a highway unless that vehicle is constructed and loaded so as to prevent its contents from dropping, shifting, leaking or escaping from the vehicle. If any part of the load escapes while on the highway, you are in violation.

Federal regulations

Definitions:

Interstate Commerce: Movement of persons or property from one jurisdiction to another jurisdiction, i.e., state to state, based on the load’s origin and destination.

Intrastate Commerce: Movement of persons or property from one point in Wisconsin to another point in Wisconsin. The load does not come from another state and/or does not leave the State of Wisconsin.

Farmer: Any person who operates a farm or is directly involved in the cultivation of land, crops or livestock which are owned by that person; or are under the direct control of that person.

Commercial Driver’s License: The Commercial Driver’s License (CDL) is a federally-based requirement that is regulated by individual states. Farm vehicle drivers are exempt from the CDL requirements if the commercial motor vehicle is:

(a) Controlled and operated by a farmer as a private motor carrier of property;

(b) Being used to transport either:

(1) Agricultural products, or

(2) Farm machinery, farm supplies, or both, to or from a farm;

(c) Not being used in the operation of a for-hire motor carrier;

(d) Not carrying hazardous materials of a type or quantity that requires the commercial motor vehicle to be placarded, and

(e) Being used within 150 air miles of the farmer’s farm.

A commercial motor vehicle (CMV) requiring a CDL is a motor vehicle or combination of motor vehicles used in commerce to transport passengers or property if the motor vehicle is:

(a) A combination of vehicles with a registered, actual gross vehicle weight rating (GVWR) or a gross combination weight rating (GCWR) of 26,001 lbs. or more inclusive of a towed unit(s) with a GVWR of more than 10,000 lbs. or

(b) A single vehicle with a gross vehicle weight rating (GVWR) of 26,001 lbs. or more, or

(c) Designed to transport 16 or more people including the driver, or

(d) Is of any size and is transporting hazardous materials in an amount sufficient to require placards.

Reciprocity agreements

Reciprocity agreements between states only cover registration and fuel tax. Any operation across state line requires the carrier to comply with the federal regulations and be indicated as an interstate carrier with its USDOT number.

Farmers may operate their farm registered trucks over 26,000 pounds without registering their vehicles for the state they are operating in as long as the truck is used in their farm service operation.

Farmers may operate their commercial motor vehicle over 26,000 pounds up to 30 miles into Minnesota, Michigan or Iowa and not be required to obtain vehicle registration or fuel tax for that state. Any travel beyond 30 miles requires the vehicle to have a trip permit for registration and fuel tax or have the appropriate registration and fuel tax license.
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For purposes of equipment, maintenance, logs etc., Federal Motor Carrier Safety Regulations define a CMV as a vehicle or combination with a GVWR/GCWR of 10,001 lbs. or more. However, Wisconsin Statutes 194.05(4) contains an exemption from FMCSR for farm trucks or dual purpose farm trucks combined with any semi-trailer or farm trailer or any vehicle combined with a horse trailer. If the vehicle combination's gross combination weight rating, registered weight and actual gross weight do not exceed 26,000 lbs, and the vehicle combination is operated solely in intrastate commerce. For CMV's operating in interstate commerce or not fitting that specific Wisconsin Statutes 194.05(4) exemption, Federal Motor Carrier Safety Regulations apply. Federal Motor Carrier Safety Regulations are available on-line at www.fmcsa.dot.gov under Rules and Regulations.

Medical Certificate: All intrastate drivers in vehicles GCWR, GVWR or actual weight in excess of 10,000 lbs. must possess a medical certificate (for farmers-articulated [combination] vehicles only). Wisconsin intrastate drivers in a CMV less than 26001 lbs. are exempt from the requirement of a medical certificate.

Hours of Service: If the trip is over 100 air miles one way, you need a log book to record your hours of service. Aside from the agricultural exemption, the log book would be required of a driver of any type of vehicle over 10,000 lbs. on an interstate trip or over 26,000 lbs. on an intrastate trip.

Care should be taken not to confuse these groups of regulations. The CDL rules apply differently than equipment, lighting, medical cards or log books, and farmers have exemptions or limited exemptions from some of the regulations. For example, you may need a CDL but not a log book, or you may need a log book when going interstate but not intrastate. If you are uncertain, ask questions prior to your trip. Wisconsin treats violations of CDL regulations as traffic violations. They carry serious fines and point assessments.

Frequently asked question:
“Do I need to stop at scales?”

Wisconsin Statute 348.19 requires vehicles to be weighed when directed to do so by a traffic officer. The remaining requirements are covered under Administrative Rule. Transportation rule 312.03(2) states, “…the Department chooses not to require operators of trucks having a gross weight of 8,000 pounds or less to stop at open weigh stations unless directed to do so by a traffic officer.”

Resources:
FMCSA Web site: www.fmcsa.dot.gov
CMV registration: www.dot.wisconsin.gov/drivers/plateguide/heavy-truck.htm
Motor Carrier Enforcement Information System: (608) 267-9762
Driver license/records: (608) 267-2153
License plates and titles: (608) 266-1466

State Patrol telephone directory
Hill Farms State Transportation Building
State Patrol: (608) 266-3212
Southwest Region
DeForest Post: (608) 846-8500
Tomah Post: (608) 374-0513
Southeast Region
Waukesha Post: (262) 785-4700
Northeast Region
Fond du Lac Post: (920) 920-3700
North Central Region
Wausau Post: (715) 845-1143
Northwest Region
Eau Claire Post: (715) 839-3800
S寥ner Post: (715) 635-2141
State Patrol Academy: (608) 269-2500

Safety and weight enforcement facilities (SWEFs)
Dickeyville: (608) 678-4536
Madison: (608) 838-7032
La Prairie: (608) 758-6740
West Salem: (608) 786-0275
Kenosha: (262) 857-7360
Racine: (262) 835-4028
Wrightstown: (920) 766-1424
Newton: (920) 726-4521
Abrams: (920) 826-5368
Hudson: (715) 749-3744
Menomonie: (715) 235-4581
Superior: (715) 398-6822
Coloma: (715) 249-5920
Notes

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Appendix

Regulations Summary

- It is illegal for manure to run off the intended application site
- Manure spills must be reported immediately
- Some farms are under tighter regulations than others

- WPDES Farms (>1,000 animal units)
  - These farms need a permit from DNR. Each permit spells out how manure is to be applied on their acres

- Farms under nutrient management plans
  - Manure rates can not exceed pre-determined levels
  - Field specific applications based on soil tests
  - Rates are lowest the year after alfalfa, highest on continuous corn
  - Regulating authority may be county, township, or USDA
  - Setbacks required year-round
    - No manure within 50 feet of wells
    - Incorporation required within 200 ft upslope of wells, sinkholes, tile inlets and other direct conduits to groundwater
    - 300 ft upslope of a stream/1000 ft of a lake or pond, Rates are limited based on soil moisture content. Also, ONE of the following must be present:
      - Permanent buffer
      - 30% crop residue
      - Fall cover crop after fall application
      - Incorporate/inject, BUT must meet conservation plan crop residue requirements
  - Setbacks required WHEN FROZEN or SNOW COVERED
    - No manure 300 ft upslope of a stream/1000 ft of a lake or pond
    - No manure on slopes >9% (12% if contour farmed)
    - Rates limited to next crop’s P removal or 7,000 gal, whichever is lower

Contact Information:

County Conservation Department: http://wlwca.org/
DNR animal waste specialists: http://www.dnr.state.wi.us/runoff/ag/agcontacts.htm
DNR local wardens: http://dnr.wi.gov/org/caer/cs/ServiceCenter/locations.htm
DATCP Nutrient Management program: http://www.datcp.state.wi.us/arm/agriculture/land-water/conservation/nutrient-mngmt/planning.jsp

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“The U.S. Department of Agriculture prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, and marital or family status.”

Updated 1/3/2008 Jerry Clark/Ted Bay/Kevin Erb/Carla Hargrave UW Extension / PNAAW
Original author: Nathan Gilson, UW Extension, 2003
Appendix

Checklist for Setbacks and Application Restrictions

Prohibition Areas
- Concentrated flow channels with established vegetative cover
- Vegetative buffer areas
- Non-farmed wetlands
- Land where established vegetation is not harvested

Area within 50 ft of a well

Within 200’ upslope of direct conduits to groundwater, unless incorporated within 3 days
  - Wells
  - Sinkholes
  - Fractured bedrock at the surface
  - Gravel/sand pits

FROZEN SOILS, DO NOT apply nutrients:

Within the surface water quality management (SWQMA) areas - 1000’ of lakes, 300’ of perennial streams (refer to map on next page)

On slopes >9% (can apply manure on slopes up to 12% where cropland is contoured or contour strip cropped)

Apply manure P2O5 so as not to exceed current year’s crop removal and limit liquid manure applications to 7,000 gallons/acre

Limit available N applications on:
- High permeability soils
- Soils with less than 20 inches to bedrock
- Soils with less than 12 inches to apparent groundwater:

50°F or less in the Fall:
  • Limit available manure N to 120 lbs/A

Greater than 50°F in the Fall (pick one):
  • Limit available manure N to 120 lbs./A + nitrification inhibitor
  • Limit manure applications to crop N need or 120 lbs. ac + on perennial or fall seeded crops
  • Limit available manure N to 90 lbs. / ac + apply after Sept. 15th

Non-frozen soils within a SWQMA:
- No liquid manure (<12% solids) applications on saturated soils

Use one or more of the following practices:
1. Establish & maintain permanent vegetative buffers
2. Maintain 30% crop cover on soil surface after application
3. Incorporate nutrients within 72 hours
4. Cover crop established promptly following application
The Question
Instinct, like N-Serve, is a nitrogen stabilizer to inhibit the bacteria that naturally convert N from the ammonium form to the mobile nitrate form. Unlike N-Serve, however, Instinct is a microencapsulated formulation that remains stable on the soil surface for up to 10 days, allowing growers flexibility in fertilizer application and incorporation and, thus, making it an ideal choice when applying liquid manure. But, like N-Serve, it too is registered by EPA as a pesticide so the question came up whether a custom manure hauler applying manure containing Instinct needs to be a certified and licensed pesticide applicator.

The N-Serve Example
Not too long ago, a similar question was asked whether a co-op employee needs to be a certified and licensed pesticide applicator when applying N-Serve and the answer to that question is ‘no’. The reason for this is two-pronged: first, the application of N-Serve, a pesticide, is to the fertilizer itself with the purpose of protecting the fertilizer and, as such, the fertilizer with N-Serve is considered a “treated article”, exempt from further EPA regulation. Second, the untreated fertilizer in most cases is owned by the co-op, and being N-Serve is a non restricted-use pesticide, a co-op employee may mix (add) N-Serve to the nitrogen fertilizer without being certified or licensed. And being the co-op applicator is applying a treated article, even if the article was previously treated with a restricted-use pesticide, that person too is not legally required to be certified and licensed. A detailed discussion on N-Serve and pesticide certification requirements may be searched in the Wisconsin Crop Manager newsletter archives (ipcm.wisc.edu).

So, if a co-op employee does not need to be a certified and licensed pesticide applicator to mix and/or apply N-Serve, and because Instinct is protecting the nitrogen in manure making it a treated article as it is with ammoniacal fertilizers protected by N-Serve, it would seem logical that a custom manure hauler also would not need to be a certified and licensed pesticide applicator when mixing and/or applying manure treated with Instinct. To answer this question, we have to separately discuss the handling task of mixing and the handling task of applying. The reason why the handling tasks of mixing and applying becomes important boils down to who owns the fertilizer product at the time Instinct is mixed or applied. When dealing with N-Serve, we indicated that in most cases the co-op owns the fertilizer. But when dealing with Instinct, it is typically the farmer who owns the manure, not the manure hauler.

The Answer to Different Scenarios
Mixing (adding) Instinct with manure. Farmers may mix Instinct with manure, and load and apply this manure to property in their control, without becoming certified pesticide applicators because Instinct is not a restricted-use pesticide. Uncertified farmers also are allowed to mix, load, and apply Instinct for up to three different producers not to exceed 500 acres in any one calendar year. However, any farmer exceeding these allowable limits would require certification and licensing as a commercial pesticide applicator in the Field & Vegetable Crops category. Likewise, an uncertified farmer may mix Instinct to manure they own prior to application by a custom manure hauler.
Appendix

Does a Custom Manure Hauler Need to Be a Certified Pesticide Applicator to Apply Instinct?

The Answer to Different Scenarios (Continued)

If a custom hauler mixes Instinct to manure owned by others, then he/she would need to be certified and licensed as a commercial pesticide applicator in either the Mixer/Loader category (mix and load pesticides) or the Field & Vegetable Crops category (mix, load, or apply pesticides). Wisconsin law requires that commercial applicators for hire must be certified and licensed to mix, load, or apply any pesticide, whether or not the pesticide is restricted-use.

Applying manure pre-mixed with Instinct. If the farmer premixes Instinct with manure before application by a custom hauler, the hauler would not require pesticide applicator certification and licensing to apply the manure because it is considered a treated article (the very same reason why a co-op employee is exempt from pesticide applicator certification and licensing when applying a fertilizer already treated with N-Serve).

Applying manure and Instinct simultaneously. If the farmer-owned manure and Instinct are applied or injected simultaneously by a custom hauler/applicator, the person performing this operation must be certified and licensed as a commercial pesticide applicator in the Field & Vegetable Crops category because this is considered a for hire pesticide application (also true of a co-op employee injecting N-Serve to farmer-owned nitrogen fertilizer).
Biosecurity for Manure Handlers

- Arrange ahead of time to meet the owner, manager or a representative of the facility at an appointed time and place. Schedule the initial meeting away from the premises if possible. If an on-premises visit is required, discuss what biosecurity procedures are to be followed, number of personnel to be included, purpose of the visit and the specific areas to be entered.

- Enter through an access point that keeps you from driving in areas where animals are kept. While on the farm, keep vehicles and equipment away from livestock areas.

- Don't enter or approach livestock areas or utility buildings, or leave your work area, without prior approval by an authorized farm representative or unless accompanied by an authorized farm representative.

- Don't leave the work area without proper protective attire.

- Put on clean coveralls for each premises. Keep coveralls in a plastic bag until use, and put used coveralls in a closed container and launder them in hot water and bleach before reuse.

- Ask the owner, manager or authorized representative to provide a water source for disinfecting boots and equipment. This should be away from livestock facilities.

- Bins or buckets and brushes used for disinfection need to be void of organic matter including dirt, manure, mud, dust, hair and feathers.

- Brushes used for disinfection need to be good quality, with stiff bristles.

- Wear rubber boots that don't have deep treads. Plastic slip-on covers or other disposable boots aren't recommended. Disinfect when you arrive and before you leave for the day.

- Follow manufacturer's instructions when mixing disinfectant. Use warm to hot water if possible. Clean boots of all organic matter first, and then disinfect.

- After disinfection, put boots in your vehicle, allow them to air dry at 70 degrees F. for at least 15 minutes between premises.

- Pressure wash and disinfect equipment, tires and vehicles before entering and leaving the premises.
The field is divided into 40 acres sections. It is important that the sections are near square as possible.

The hose is laid out on a diagonal with a loop or kick at the beginning and a little extra hose at the opposite or tractor end of the layout.

After one pass, the hose is dragged to the opposite end of the field. The applicator path is shown in light gray.

(Above shows the hose layout after three passes. Notice how the hose will be laid out at a right angle as the application progresses.)

This diagram shows how the hose will be at the end of a 20 acre diagonal section.

The tractor driver will make a turn down the path of the hose to the opposite diagonal corner of the 40. The driver will inject up to three-quarter the length of the diagonal. It is better to be short rather then long on this distance.

Application is preceded to approximately three-quarters of the way across the section. At that time, the driver doubles back along the hose path heading back to the applied 20 acre section. It is important to keep a portion of the hose in the applied 20 acre section.

At the diagonal, the tractor driver changes direction and proceeds down to the corner at the adjacent corner. Notice how the hose is in an “S” pattern. As application proceeds, the “S” will uncoil.

At the end, the application begins on the 20 acre diagonal section. Take note of the small kink in the middle. If there was a little extra hose in the start, the “S” will not uncoil all the way. This prevents the driver from pulling the entire hose length.

When done, the hose is again laid out at a right angle.

Notice how the amount of hose is the same at the end of application, only it is at a right angle to the original application layout.

There should be some slack in the hose while making the “Y” or 3 point turns. If the hose is tight, the sides must be shortened up to prevent hose pulling.
Record-keeping requirements may vary according to permit. See your permit for specific record-keeping requirements that apply to your operation.

**Notice:** Collection of this information is authorized under Ch. NR 243, Wis. Admin. Code and s. 283.55, Wis. Stats. Failure to submit the requested information may result in penalties pursuant to ss. 283.89 and 283.91, Wis. Stats. These records shall be maintained onsite for a period of at least 5 years from the date they are created. Failure to retain the requested information may result in penalties pursuant to ss. 283.89 and 283.91, Wis. Stats.

<table>
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<tr>
<th>Application Date</th>
<th>Driver ID</th>
<th>Field</th>
<th>Acres Applied</th>
<th>Manure/Process Source</th>
<th>Spreader Volume</th>
<th># Loads</th>
<th>Soil Conditions*</th>
<th>Weather**</th>
<th>Application</th>
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<td></td>
<td></td>
<td></td>
<td>(saturated, non-saturated, frozen, snow)</td>
<td>(temp &amp; precipitation)</td>
<td>(Inject, Incorp, or Surface)</td>
</tr>
</tbody>
</table>

* If your permit requires reporting on soil conditions, see Ch. NR 243.03, Wis. Admin. Code for soil condition definitions (saturated, frozen, snow-covered). If snow-covered, indicate inches of snow present.

** Your permit may require that you keep records of weather conditions 24 hours before and after application. This information should be recorded in a separate Weather Log.
OPERATION NAME:__________________________________________

DATE SUBMITTED:__________________________________

THIS REPORT COVERS THE YEAR FROM __/__/__ to __/__/__

PREPARED BY:_____________________________________

Instructions:
For each landspreading application during the year indicated on this form, provide the information requested in the table below. If you landspread more than one application on a given field, record each spreading on consecutive lines. After all spreading has been completed for that field, fill in a line for its total calculated amounts, indicated by entering the word "Total" in the "Date of Application" field.

Record-keeping requirements may vary according to permit. See your permit for specific record-keeping requirements that apply to your operation. If your permit requires reporting on soil conditions*, see Ch. NR 243.03, Wis. Admin. Code for soil condition definitions (saturated, frozen, snow-covered). If snow-covered, indicate inches of snow present.

Test methods and other information for sampling manure and soil required under Ch. NR 243.19, Wis. Admin. Code shall be retained for 5 years.

Also provide the following:
- Do all fields meet Tolerable Soil Loss (T)? Y / N (if no, provide a written explanation)
- Attach "T" Compliance Worksheet. For SNAP-Plus users, attach SNAP-Plus 590 Report if applicable.
- Have all soil tests been taken within 4 years? Y / N (If no, provide a written explanation.)
  For SNAP-Plus users, attach Soil Test Report.
- Attach a copy of the manure analysis results.

Notice: Collection of this information is authorized under Ch. NR 243, Wis. Admin. Code and s. 283.55, Wis. Stats. Failure to submit the requested information may result in penalties pursuant to ss. 283.89 and 283.91, Wis. Stats. Personal information collected on this form will be used for management of DNR programs and may be used for purposes other than that for which it was originally collected. Information may be made available to requesters under Wisconsin's Open Records laws (ss.19.32-19.39, Wis. Stats.) and requirements.

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<th>Soil Test P Ave. (ppm)</th>
<th>Manure/Process Wastewater Source</th>
<th>Current Crop</th>
<th>Crop Nutrient Needs (lbs, per ton or 1000 gal.)</th>
<th>Manure Analysis (lbs avail. per ton or 1000 gal.)</th>
<th>Manure Appl. Rate (lbs/acre)</th>
<th>Previous Crop</th>
<th>Legume Credit (lbs N)</th>
<th>2nd Year Manure Credit (lbs)</th>
<th>Additional Fertilizer (lbs/acre)</th>
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Field spreading restrictions:

Field spreading restrictions:

Field spreading restrictions:

Field spreading restrictions:
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<th>Categories of Resource Protection</th>
<th>County Soil &amp; Water Conservation Dept.</th>
<th>County Zoning</th>
<th>Department of Natural Resources</th>
<th>Dept of Ag, Trade and Consumer Protection</th>
<th>U.S. Department of Agriculture</th>
<th>Footnotes</th>
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<td><strong>Soil Loss</strong></td>
<td>Enforcement of FPP requirements¹</td>
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<td>Large farm permits ²</td>
<td>Recipients of tax credits from WI Farmland Preservation Program (FPP)</td>
<td>Steepest land - Identify soil loss tolerance levels</td>
<td>¹Farmland Preservation Program Standard: - soil erosion to acceptable levels - control of gully erosion - restricted livestock access to streams ²Areas are within: - 300’ of streams - 1000’ of lakes</td>
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<td>-Voluntary</td>
<td>-Voluntary</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stream Buffer Vegetation</strong></td>
<td>Administrator DATCP voluntary program ⁵</td>
<td></td>
<td>-Voluntary</td>
<td>-Voluntary</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Manure Spreading (Field Application)</strong></td>
<td>Restricted per County Animal Waste Ordinance</td>
<td></td>
<td>-Large Farm Permits ⁷</td>
<td>-Cost share grant money for enforcement</td>
<td></td>
<td>²Large farm &gt; 1000 animal units (about 700 dairy cows) DNR Wisconsin Pollutant Discharge Elimination System (WPDES) Permit (1000 steers)</td>
</tr>
<tr>
<td></td>
<td>Ag Shoreland areas ³ (48 HR.</td>
<td></td>
<td>-Rules are similar to Manistoc AWO ⁶</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>incorporation required</td>
<td></td>
<td>-Everybody ⁷</td>
<td>-Voluntary</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hazard Areas restricted (sinkhole, bedrock, etc.)</td>
<td></td>
<td></td>
<td>-Voluntary</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nutrient Management</strong></td>
<td>New Operations ⁸</td>
<td></td>
<td>-Required if cost share provided</td>
<td>-Cost share grant money for enforcement</td>
<td>-Voluntary ⁸</td>
<td>⁴Manistoc County Animal Waste Ordinance (AWO)</td>
</tr>
<tr>
<td></td>
<td>County Animal Waste Ordinance permits (57 in County)</td>
<td></td>
<td>-Large farm permits now ⁹</td>
<td>-Voluntary ⁸</td>
<td>-Developed original standard</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Restricted areas ³</td>
<td></td>
<td>-Everybody ⁹</td>
<td>-Voluntary</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cattle Access to Streams</strong></td>
<td>County FPP requirement ⁵</td>
<td></td>
<td>-Enforce State Runoff Standards</td>
<td>-Per USDA standards when cost shared</td>
<td>-Develops minimum design standards</td>
<td>⁶Enforcement timetable of Runoff Standards - 2003 for “new” farms - 2005 for West Twin River Watershed, Branch River Watershed - 2005 for balance of County</td>
</tr>
<tr>
<td></td>
<td>Grazing Permit required per County Ordinance</td>
<td></td>
<td>-Per USDA standards when cost shared</td>
<td>-Per USDA standards when cost shared</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>-Enforce State Runoff Standards ⁸</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>-Per US Standards on large farm permits ⁸</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Per US Standards when cost shared</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Manure Storage Construction</strong></td>
<td>Mandatory standards for new or modified structures since 1998 (57 permits)</td>
<td></td>
<td>-Large Farm Permit ¹⁰</td>
<td>-Cost share grant money for enforcement</td>
<td>-Voluntary ⁹</td>
<td>⁸A) No overflow from manure storage facilities b) No unconfined manure stacks with the Water Quality Management Area c) No direct runoff from feedlots and manure storage facilities d) No unlimited access of livestock to shorelands that prevents maintenance of adequate sod cover (livestock operations and facilities)</td>
</tr>
<tr>
<td></td>
<td>-Setbacks: Roads - Property lines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Diversion of Surface Water Around Barnyard</strong></td>
<td>-Enforce State Runoff Standards when cost shared is offered</td>
<td></td>
<td>-Large Farm Permit ¹⁰</td>
<td>-Cost share grant money for enforcement</td>
<td>-Voluntary ⁹</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Restricted per County AWO ⁶</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Manure Prohibitions</strong></td>
<td>County enforces State Runoff Standards when cost sharing is offered</td>
<td></td>
<td>-All Farms ¹ⁱ</td>
<td>-Cost share grant money for enforcement</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Set standard</td>
<td></td>
<td>-Set standard</td>
<td>-Cost share grant money for enforcement</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Enforce when impacting waters of the State</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Farm Locations</strong></td>
<td>-Zoning Ordinances ⁹</td>
<td></td>
<td></td>
<td>-Voluntary</td>
<td>-Voluntary ⁹</td>
<td></td>
</tr>
<tr>
<td><strong>Sludge &amp; Irrigated Waste Water</strong></td>
<td>Restricted per AWO ⁶</td>
<td></td>
<td>-Regulated and licensed by DNR</td>
<td>-Voluntary</td>
<td>-Voluntary ⁹</td>
<td></td>
</tr>
<tr>
<td><strong>Bulk Manure Application</strong></td>
<td>-Voluntary</td>
<td></td>
<td>-County Sanitary Code</td>
<td>-Voluntary</td>
<td>-Voluntary ⁹</td>
<td></td>
</tr>
<tr>
<td><strong>-Silage Leachate - Milkhouse Waste Water</strong></td>
<td>-Voluntary</td>
<td></td>
<td>-When Waters of the State are impacted - Cost share grant money for enforcement</td>
<td>-Voluntary</td>
<td>-Voluntary ⁹</td>
<td>⁷State Applicators Association Developing Certification Process DRAFT 2/13/03</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-Voluntary</td>
<td>-Voluntary ⁹</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
Online Weather Resources for Manure Application

One of the most common factors in manure runoff situations is precipitation. Rainfall, snowmelt, or a surprise summer thunderstorm can quickly turn a normal manure application into a potential problem. Forecasted precipitation events should not be viewed as a reason to hurry up and get manure applied to fields. Rather, they represent a spreading condition that must be viewed with caution. Producers need to manage their applications with respect to potential future precipitation and consider additional management options or avoiding application altogether when precipitation is forecasted or imminent. Weather forecasts are one means of determining when additional management options are necessary or appropriate. While weather forecasts have not always been accurate (a 1997 study by UW-Green Bay students showed that the precipitation accuracy for January-March was <60%), more modern forecasts are the best tool we have when planning applications during certain times of the year.

The following pages outline several resources available online for professional manure applicators and farmers. There are far too many online sites to examine here in detail, but the following will give you a flavour for what is available. Radar is available on hundreds of sites, so that will not be covered here. The mention or absence of a particular service does not imply endorsement or lack thereof.

**Fee vs. Free:** There are a number of fee-based online weather services available – some online, and some through specialty services like DTN.com or cell phone providers. These non-internet services may be a better deal in the field where internet access is not available or older phone lines make decent connections difficult.

**Liability:** When depending on forecasts in making a decision on whether or not to spread, it is important that you print copies of the forecast used and keep on file for at least one year. Keeping them for 3 years is better, but space in your filing system may be limited. Since forecasts change often, you should check at least once per day, more often if necessary. While documenting that you took into account forecasted precipitation does not remove liability when runoff events occur, it is a factor that can be considered when regulatory agencies are determining an appropriate enforcement response. In addition, documenting that you looked at a forecast does not provide any benefit if you did not take appropriate responses to the forecast. Other factors that can impact an enforcement response include the actions a producer takes to address a precipitation-related runoff event once it is discovered.

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**Local Forecasts by Zip Code:** Many websites and local TV stations now offer the ability to type in the zip code of the farm and view the forecast. Popular ones include www.weather.com, www.intellicast.com, and www.weather.gov. It is important to make sure that the forecast you are viewing is up-to-date. Some services update every few hours, others every day or so.

**Tabular Forecasts:** A number of services now offer hour by hour forecasts. Below is the www.weather.gov forecast for Abbotsford, WI (go to “Additional Forecasts and Information”, click on “tabular”) for September 25, 2006: Note that it lists the % chance of rain for each hour from the current time to 3 days out, in addition to high temperatures.

![Image of tabular forecast](image)

Starting at hour 16 (1600 hours military time, 4 pm conventional), the hour by hour predicted conditions are shown. Note that the chance of rain (PoP) remains below 20% until hour 19 on the 26th (5 pm), then jumps to 61% until 1 am, then back down again. The bottom row (Rain) shows it is likely during these hours, then becoming a scattered chance (SChc) after. Of course, this type of forecast does not predict the amount of rain, just whether it will rain or not (or whether the temperature will get above freezing and the snow start melting).
So How Much Will It Rain?

The decision on whether or not to spread manure must also be based on the amount of rainfall forecast. One of the easier to use options for determining precipitation probabilities is the National Weather Service forecast model graphics website: http://www.nws.noaa.gov/ml/forecast/graphics/MAV/index.html

The National Weather service uses several computer models (GFS (MAV) MOS,Eta/MET MOS and GFSX/MEX MOS)—the one EPA recommends for the upper Midwest is the GFV (MAV) MOS, and this link takes you right to that model’s output. Note that the forecast is a synthesis of all 3 models (plus the intuition of the weather forecasting staff), while the graphic is just one model’s output. Hence this map may differ (and on this date, it did) from the tabular forecast.

Once there, under “precipitation”, we clicked the down carrot on the right side to get this menu.
You can view maps showing wind, temperature and more from this page.

Once there, under “Precipitation” on the left side, select the incremental category you want (1 hour, 3 hour, 6 hr, 12 hr or 24 hr) and the amount of rain (0.1 inches up to >1 inch). This will generate a map, and across the bottom of the screen are the time increments you selected. For the one below, I’ve looked at the > .1 inch in 6 hour increments, and have clicked on Thursday (that’s the first time that rain is forecast in Wisconsin by this model). PLEASE NOTE that the time on the map is not in our timezone – during Standard time, subtract 6 hours. During Daylight Savings, subtract 5 hours. This is explained by clicking on the yellow button on the bottom of these screens.
The map above shows the chance of rain between 7 am and 1 pm on Wednesday of that week (remember, 5 hours difference in summer, 6 in winter)

Using the Maps

Once you have the maps, you now need to make a decision: Is it safe to spread, or should I wait? While there are no hard and fast regulations for all farms in Wisconsin at this time, the following guidelines will help you make that decision.

1. **What can the soil absorb?** The 590 standard has a table that looks at how much moisture a field can absorb before runoff occurs. Use of this table is only required in sensitive areas (near water resources), however it does provide good guidance for determining if soils in any field are saturated or can absorb liquid manure.

<table>
<thead>
<tr>
<th>Surface Texture Class</th>
<th>A (m)</th>
<th>B (m)</th>
<th>Allowable Soil Moisture Description for Applications</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine</td>
<td>&lt; 30%</td>
<td>3000</td>
<td>Easily ribbons out between fingers, has a slick feel.</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>3000</td>
<td>5000</td>
<td>Forms a ball, is very pliable, sticks readily with clay.</td>
<td></td>
</tr>
<tr>
<td>Coarse</td>
<td>7000</td>
<td>10000</td>
<td>Forms a weak ball, breaks easily.</td>
<td></td>
</tr>
</tbody>
</table>

A. Fine - clay, silty clay, silty clay loam, clay loam  
   Medium - sandy clay, sandy clay loam, loam, silt loam, silt  
   Coarse - loamy sand, sandy loam, sand. This category also includes peat and muck based on their infiltration capacity  

B. Crop residue or vegetative cover on the soil surface after manure application.

C. Soils are saturated when you can do these actions with a handful of soil - do not apply in these cases along streams and sensitive areas.
In addition, factors that producers must also take into account include previous manure applications and precipitation events. If the soil is already moist, it can absorb less liquid manure than a dry soil. Remember too that recent manure applications events can seriously inhibit the ability of the soil to absorb additional moisture. This makes pollutants associated with manure highly mobile when any amount of additional precipitation occurs.

2. **What will happen if it rains after application?** Different soils absorb moisture differently—sands much more quickly than clays. The EPA guidance for permitted livestock operations is based on soil hydrologic group. Their guidance suggests that manure, litter, or process wastewater shall not be surface applied when the National Weather Service predicts a 50 percent or more probability of rain in excess of the amount that is reasonably likely to generate runoff, as provided below, within 24 hours of the end of an intended application.

### Minimum Quantity of Rainfall Required to Create Runoff (EPA Guidance)

<table>
<thead>
<tr>
<th>Hydrologic Soil Group</th>
<th>Quantity of Rainfall (Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.0</td>
</tr>
<tr>
<td>B</td>
<td>0.5</td>
</tr>
<tr>
<td>C</td>
<td>0.25</td>
</tr>
<tr>
<td>D</td>
<td>0.25</td>
</tr>
</tbody>
</table>

For Hydrologic Soil Group B soils, you would on the previous page, select the forecast product labeled, "24H Prob.>=0.5in. Different soils react differently based on cropping history, and this map should only be one of many factors you consider. The actual Hydrologic Group for each field (and soil) is available from the NRCS (Natural Resources Conservation Service) soil survey. Talk to the local office or the farmer’s crop consultant for more information.

Soils that become saturated as a result of recent manure applications or precipitation following applications can no longer hold moisture. Manure related pollutants can run off a field either with the manure or along with the precipitation related runoff. Under saturated conditions, pollutants associated with recent applications are also more prone to seep or be “pushed” into drain tiles that can lead directly to streams.

**Summary and Conclusions:**

Given the history of manure-contaminated runoff, it is essential that manure applicators pay attention to both soil conditions and the weather forecast. Using the technological tools available and documenting your actions will reduce the chance of a problem happening, and decrease your liability should one occur.
Do you have suggested improvements for this manual? Are there inconstancies or inaccuracies?

We want your feedback!!! Please remove this page, add your suggestions and send it to:

Winnebago County UW-Extension
Attn: Nick Schneider
625 E. County Rd. Y
Oshkosh, WI 54901

Call: 920-232-1970 or email: nick.schneider@ces.uwex.edu