Train Lighting/Marking During Hours of Darkness

General Rules of the Road:

1. Agricultural vehicles must move to the right and not operate left of center when meeting oncoming traffic

2. Agricultural vehicles must warn intent to turn

Current lighting and marking standards for any vehicle that will extends 4 feet or more left of the centerline of the power unit requires:

- 1 amber reflector on the left side facing forward marking the extreme width

On each side of vehicles in the train you will need:

- 1 amber or red light OR
- 1 amber or red reflector OR
- 1 slow moving vehicle (SMV) symbol

A SMV sign must be displayed day or night on any vehicle or implement traveling less than 25 mph.

1. List one of the options that are required on each side of the vehicles in a train:

   ____________________________

2. A SMV sign needs to be displayed on any agricultural vehicle or implement traveling less than ____________ mph.
Manure Gases and Confined Spaces

Understanding Manure Gases

The four main gases produced with the decomposition of manure are hydrogen sulfide, ammonia, carbon dioxide and methane. The primary hazards of these gases are toxicity, asphyxiation and potential for explosion.

The most serious problems with gases occur when manure is agitated or when ventilation systems are inadequate or fail. However, gases are constantly being produced and there is never a 'safe' time to enter manure storage facilities or other confined spaces, such as tanks, within a manure handling system.

Factors that increase gas production: (especially hydrogen sulfide)

- Manure temperature increases
- Manure pH decreases
- High sulfur content in manure due to high sulfur diets
- Silage runoff
- Spoiled feed
- Bedding additives (such as gypsum)

THE SAFETY HIERARCHY

Eliminate the hazard
Safeguards
Warnings
Training
PPE

Get rid of the hazard completely, replace old systems, change production and other system factors

Guard shields, fences, barriers, interlocks, shut-down devices, ROPS (roll-over protection systems) etc.

Provide "how to" instruction, demonstrate safe processes and procedures, encourage the trainee to demo back

Warning labels, owners' manuals, training guides, written protocols

Personal protection equipment (PPE) includes masks, respirators, safety glasses, hearing protection, etc.

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Confined Spaces

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.

If your procedures allow for entry, and entry is required, take the following precautions prior to entering a confined space:

1. Ventilate the space
2. Use a retrieval system (such as a safety harness)

If at any time an employee of your company or the host farm, loses consciousness in a confined space, DO NOT ENTER AND ATTEMPT RESCUE. IMMEDIATELY proceed to follow your emergency response procedures with a call to 911.

3. Utilize the buddy system with safety attendant
4. Measure hazardous gases using a gas monitor

The only accurate measure of gas levels is an appropriate gas monitor. When working with manure systems and working in confined spaces, a multi-gas monitor is recommended.
3. Which two manure gases have odors that can be detected at certain concentrations?

_________________  ___________________

4. Which manure gases may cause death?

_________________  ___________________  ___________________  ___________________

5. What is an approved method/device to determine the risk of hazardous gasses being present in a confined space or near a manure pit?

______________________________

6. List three safety precautions that can be taken prior to entering a confined space:

__________________________  ______________________  _______________________

7. List two safety precautions to take prior to and during manure pit agitation:

____________________________  _______________________

---

**Factors that decrease gas dispersion from manure storage areas:**

- When natural wind conditions are still
- During temperature inversions
- When impermeable covers are used
- When a heavy natural crust forms

---

**Recommended safety practices during agitation:**

- Always use gas monitoring devices
- Use wind socks or flags to note wind direction and speed
- Work upwind whenever possible
- Move animals and people to a safe location prior to agitation
- Identify an emergency response plan prior to agitation
- Share the plan with all involved in the project
Nutrient Application and Regulation

Nutrient application needs to follow the 4Rs of nutrient management in order to apply the correct amount of nutrients in the most environmentally friendly way. The 4Rs include application at the Right Source, Right Place, Right Rate and Right Time.

Right Source
For nutrient management, the Right Source could be manure, urea, ammonium sulfate, ammonium nitrate, anhydrous ammonia, or others depending on crop nutrient needs. In this case, the Right Source is manure.

Right Place
Placement of manure includes surface application, incorporated and injected. How manure is placed is important so manure and nutrients do not run off fields or leach into groundwater and so plant roots can reach and use the nutrients.

There are areas where manure applications are:

Prohibited — manure can not be applied at any time.

Restricted — manure can be applied under specific conditions

See the example on the page 7 for how some of these areas are highlighted on the map. Always check the legend or key on your map to make sure you identify the areas correctly and understand what they mean. In some cases, the legend colors will overlap. If you have questions, always ask your supervisor or UWEX agent.

Prohibited areas include:
- Concentrated flow channels
- Surface waters
- Saturated soils
- Areas of active snow melt where water is flowing
- Land where vegetation is not removed
- Direct conduits to groundwater, potable wells, or within 8 feet of irrigation wells
- Areas within 50 feet of direct conduits to groundwater (private wells)
- Areas near public water supplies within 1,000 feet of a community potable water well

8. Manure can never be applied within how many feet of a community well? ______ ft

9. In restricted areas, manure can be applied under ________________________________.

10. Name three areas where manure can never be applied (prohibited):

_______________________      _______________________     ___________________
**Right Rate**

Two things a manure applicator needs is a field map that includes where manure is to be applied and the rate at which it should be applied.

The amount (or rate) of manure to be applied to a field is determined by:

- Soil test results
- Slope of the field
- Crops to be grown
- Soil type
- Type of manure

The application rate is indicated as gallons per acre or ton per acre; liquid manure can be expressed as thousand gallons per acre (KGal/A) or as gallons per acre (Gal/A) and solid manure as tons per acre (Tons/A).

**Right Time**

Sometimes where manure can be applied is conditional based on the time of year. These conditions can be combined with the Rate or the Place to ensure the least amount of damage from manure run-off or leaching. For example:

- **Time and Place**: No winter applications are allowed in SWMQAs (see the next page for a full description).
- **Time and Rate**: In winter, liquid manure applications are limited to 7,000 Gal/A rate
- **Time and Place**: Winter manure applications on fields with slopes greater than 6% (highlighted in pink) require special management to protect against the manure runoff.

---

11. Two things an applicator needs to make an accurate application of manure are:

   ______________________  ______________________

12. List two ways that you can adjust the application rate:

   ______________________  ______________________

13. A Surface Water Quality Management Area (SWQMA) is an area within ______feet from a lake or pond and ______feet from a stream or river.

14. In winter, fields with slopes greater than ________% require special management to protect against manure run-off and will be highlighted in ________.
Solid red areas:  
**Nutrient prohibited areas**

Solid red areas on the maps show where there is a prohibition on manure applications. These are often buffer areas around direct conduits to groundwater such as wells and sinkholes. The exact prohibitions for these areas vary by the feature they buffer, but in some cases fertilizer is also prohibited.

For example, there is a 1000 ft no-manure area around municipal wells to protect public water supplies. Manure can be applied if it has been treated to kill pathogens.

Red areas with black lines:  
**Winter manure prohibited areas**

These areas on marked on the map as red areas with black lines. No manure can be spread during winter in these areas.

Blue-lined areas:  
**SWQMA**

**What is a SWQMA?** SWQMA stands for Surface Water Quality Management Area. They require special care in management to avoid surface water contamination because they are adjacent to surface water. Specific conservation practices must be in place for fall, spring and summer manure applications. No manure applications are allowed in the winter. The SWQMA for streams and rivers is 300 ft on each side, while that for lakes and ponds extends for 1000 ft. Note: SWQMA is often pronounced as swik-muh.

Pink areas:  
**Winter restrictions slope > 6%**

The areas in pink are likely to have slopes greater than 6%. Winter manure applications on fields with slopes greater than 6% require special management to protect against the manure running off.

**When is winter?** Winter conditions are defined as having frozen or snow-covered soils that prevent effective incorporation at the time of application.
Identifying Manure Spreading Restrictions

Using the map and the information on the previous page, answer the following questions:

15. What fields have **winter manure prohibited areas**?  
   _______ _______ _______ _______

16. What fields have **no winter restriction areas**?  
   _______

17. Which fields are in a **SWQMA** (hint: all fields that have winter manure prohibited areas also are in a SWQMA)?  
   _______ _______ _______ _______

18. How many **nutrient prohibited areas** are on the map?  
   _______
Handling a Manure Spill

When a manure spill happens, you need to take action and follow six important steps.

19. A spill is (check all that apply):

- a. Any release of manure that has the potential to threaten ground or surface water
- b. Any release of manure greater than 1,000 gallons
- c. Any release of that manure reaches a stream or pond
- d. None of the above

20. Assume you are applying manure in a field, and a spill occurs. As an employee in the field (not the boss), place the following spill response steps in the correct order: 1 being the first step you do, 6 the last step

- Begin the cleanup
- Call the DNR or appropriate agency
- Control the spill by turning off the pumps
- Determine the best way to contain the spill (plow, chisel, berm)
- Fill out documentation and paperwork
- Notify my supervisor

All agricultural or livestock operations, regardless of size, must report manure spills or runoff that may affect Wisconsin's waters to the Department of Natural Resources.
Spill Response and Public Relations

THE SIX SPILL RESPONSE STEPS:
(1) Control the spill (2) Notify your supervisor (3) Contain the spill
(4) Contact appropriate authorities (5) Clean-up the spill (6) Document the spill

21. For the situation below, decide on a course of action for your firm in dealing with the current farm you are on and the farm with the potential manure pit overtopping.

Your firm received a call from a farmer at 7:00 in the morning on the Thursday before Labor Day. The farmer said that their manure pit will overtop on a 400 cow dairy 30 miles away at some point over the holiday weekend. The farm's regular hauler is not available until the following Tuesday because they are currently pumping a pit for a CAFO farm and are trying to finish prior to potential rain later in the holiday weekend. Frequent rains throughout August have slowed the application season, thus creating the overtopping issue. Your firm is also behind schedule from the excess rain and is working on the farm of one of your larger and best clients.

22. Consider spill response steps and public relations course of action in the following situations:

22. A manure tanker was rear-ended by a truck as it was about to turn right causing the tanker to overturn in the ditch. 7000 gallons of liquid manure were released. How would you respond to this issue?

23. You are stopped by the state patrol after a complaint that your truck is “very dirty and ruining a Labor Day party” for a family along your route. How would you respond to this issue?

24. Your dragline ruptured in the ditch just prior to the field entrance and is continuing to pump manure. The flow of manure in the ditch is heading west towards water well. How would you respond to this issue?
CAFOs: Concentrated Animal Feeding Operations

A CAFO is an animal feeding operation that has 1,000 animal units (AUs) or more. CAFOs are regulated by the Wisconsin Department of Natural Resources (DNR). Under special circumstances, the WI DNR can designate a smaller farm as a CAFO if they have had a pollutant discharge to surface water or if they contaminate a well.

CAFO examples:
- 700 milk cows x 1.43 animal units = 1000 AUs
- 910 heifers (800-1200 lb) x 1.1 animal unit = 1000 AUs
- 1000 steers x 1 animal unit = 1000 AUs
- 2500 pigs (55 lb to market) x 0.4 animal unit = 1000 AUs
- 200,000 broiler chickens x 0.005 animal units = 1000 AUs

Manure rules pertaining to CAFOs:
- Every load of manure applied to a field must be documented
- No liquid manure spreading on frozen or snow-covered ground
- No manure spreading February 1st to March 31st
  - Additional restrictions for solid manure on frozen ground prior to February 1st
- No spreading of manure within 100 feet of a private well & 1,000 feet from a community well
- No manure spreading on the following restrictions:
  - Soils with a depth to bedrock less than 24 inches
  - Soils with groundwater within 24 inches of the surface
- Additional SWQMA, including intermittent streams:
  - CAFOs have multiple options for applying manure in the SWQMA, it’s important to know what those are when custom applying manure
  - Many other spreading restrictions not listed

590 Restrictions

NR 243 Restrictions

A CAFO must follow both the 590 Standard AND the CAFO rules, NR 243.

25. Which two of the following farm sizes are considered a CAFO (1,000 animal units or more)?
- [ ] 900 milking cows
- [ ] 20,000 chickens
- [ ] 2,500 pigs

26. What Wisconsin agency regulates WPDES Permitted (CAFO) farms? ___________

27. When spreading manure for a CAFO farm, how far away must you stay away from a private well? ____________ feet

28. Every load of manure spread for a CAFO farm must be documented. [ ] True [ ] False
Wisconsin’s Manure Management Advisory System: Tools for Nutrient Applicators

www.manureadvisorysystem.wi.gov

The Wisconsin Manure Management Advisory System is a set of maps to help farmers and others who apply nutrients to identify suitable cropland areas for spreading. The maps are in two categories: Short-term runoff risk assessment, for daily application planning, and WI 590 nutrient management, for long-term application planning.

Main Components of the WI Manure Management Advisory System

- Runoff Risk Advisory Forecast
- SnapMaps 590/NR243 Maps
- SnapPlus Nutrient Management Software
  snapplus.wisc.edu
- DATCP NM Planning
- DATCP Geodata

Runoff Risk Advisory Forecast (RRAF) – for acute runoff risk due to soil and weather conditions

- A decision making tool, not a regulatory tool
- Predicts the potential for runoff based on predicted precipitation, predicted temperature, modeled soil moisture, extent of snow cover and modeled snow melt

What the Colors Mean

<table>
<thead>
<tr>
<th>Runoff Risk (3-day)</th>
<th>Winter Runoff Risk (10-day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low - no runoff predicted within the basin.</td>
<td>Frozen/snow covered soil - runoff is not yet in the forecast but applications should be made with caution due to limited soil contact and infiltration.</td>
</tr>
<tr>
<td>Moderate - low volumes of runoff predicted for some areas within the basin.</td>
<td>Runoff - runoff is in the forecast within the next 10 days (most likely because of rain), with no snowmelt alert.</td>
</tr>
<tr>
<td>High - runoff very likely to occur within the basin.</td>
<td>Snowmelt runoff - snowmelt is predicted within 10 days leading to runoff within the basin. Rain may also be in the forecast. Consult the pop-up box for the basin for more details.</td>
</tr>
</tbody>
</table>

NEED TO SPREAD WHEN IT’S RED?

- Avoid spreading: use neighboring storages, infield stacking (see NRCS 313 pg. 14)
- Identify low risk fields using the 590 restriction maps
- Incorporate whenever possible