Pop quiz:
Can you find the unsafe practice in this picture?
Pop quiz:
Can you find the unsafe practice in this picture?

Answer: The pump tractor is not secured with a wheel chock, cable or chain.
Lights and Marking When Operating Implements of Husbandry (IoH)

Not all vehicles used in agriculture are Implements of Husbandry (IoH). Tractors, manure tankers or spreaders, agitators and pumps, would be common IoH. What isn’t an IoH are trucks, truck-tractors, military vehicles or construction machinery.

A slow-moving vehicle (SMV) emblem is a required marking on any type of IoH that usually travels at speeds less than 25 mph. It is to be displayed at all times on the most visible rear area of the vehicle or combination of vehicles.

Things getting a tricky after that. Basically, there are different rules for operating during hours of darkness for IoH and Wide IoH. A best practice is to operate under the Wide IoH lighting and marking requirements as it’s easy to find today’s equipment crossing the centerline.

First, what are hours of darkness? The period of time from 1/2 hour after sunset to 1/2 hour before sunrise and all other times when there is not sufficient natural light to render clearly visible to any person or vehicle upon a highway at a distance of 500 feet.

Second, what’s the difference between IoH and Wide IoH? A Wide IoH exceeds 15 feet in total width or extends over the center of the roadway into a lane intended for the opposite direction of travel. Width is determined by the widest measurement of the equipment in a highway transport configuration.

OK, so what are the rules? The biggest difference is that for an IoH, lighting or lamps are required to be activated during hours of darkness. However, for Wide IoH, lighting and lamps are required to be activated at all times when vehicle(s) are operated on the road or parked in the right-of-way.

For more detailed descriptions of vehicle lighting and marking requirements, as well as more information about road safety.

1. A SMV sign needs to be displayed at all times on any agricultural vehicle or implement traveling less than _______________ mph.

2. Wide IoH require lights and lamps to be _______________ during the day or night when on the _______________ or working in the road right of way.

https://fyi.uwex.edu/ioh/
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.

3. Which two manure gases have odors that can be detected at certain concentrations?

4. Which manure gases may cause death?

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**Factors that increase gas production:**

- 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)
Working in 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** that includes a safety harness, tripod, and winch and have adequate personnel available
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.

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.

Factors that **INCREASE RISK** by decreasing 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

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:**
**Manure Agitation**

**Best Safety Practices**

- Be sure operators are properly trained on equipment operation and the safety plan
- Always use gas monitoring devices
- Ensure that gas monitors have a current bump test/calibration per company safety plan
- Use wind socks/flags to note wind direction/speed
- Agitate only from designated ramps and locations to prevent erosion/damage to manure storage

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**Before agitation:**

- Move animals to a safe location and keep additional personnel out of the area or barns
- Develop/share an emergency response plan with all involved
- Routine maintenance check: oil, grease, fuel, etc.
- Open/close correct valves on pump before backing into manure storage
- Place tractor and agitator pump upwind to reduce exposure to released manure gases
- Use caution when backing the pump into the storage, tractor should be operated at a low speed
- Use blocks, chains, or cables on pump tractor next to storage basin
- Remove cap from pipe

**Beginning agitation:**

**Dangerous gasses are released when the manure crust is broken**

- Visually check that there is no damage to equipment and safety devices are in place
- Check surroundings before turning on PTO, only authorized personnel should be in area
- Slowly lower pump into storage while beginning agitation
- Agitate surrounding pump area before pumping manure out of storage basin

**During agitation:**

**If weather conditions favor a temperature inversion, trapped manure gasses can be lethal**

- Be aware of the pump nozzle direction
- Don't aim pump nozzle into air; causes possible nitrogen loss and is less effective
- Focus agitation on solid areas—manure pipe inlets tend to have high solid concentrations
- If possible, move pump/tractor around the pit throughout the day

**After agitation:**

- Follow manufacturer requirements for moving the pump (PTO disconnected, transport jack lifted, stabilizers retracted, etc.)
- Slowly operate tractor to move pump out of storage

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

__________________________________________________________________________  ______________________________________________________________________

8. During what stages of agitation are lethal manure gasses of greatest concern?

__________________________________________________________________________  ______________________________________________________________________
Following the 4Rs of Nutrient Management

**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:

- **Restricted** — manure can be applied under specific conditions.
- **Prohibited** — manure can not be applied at any time, areas include:
  - Concentrated flow channels
  - Surface waters
  - Saturated soils
  - Areas of active snow melt where water is flowing
  - Land where vegetation is not removed for crop or forage value
  - 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 municipal well (city or village well).

9. Manure can never be applied within how many feet of a municipal well? _______ ft

10. In restricted areas, manure can be applied under ____________________________.

11. Name three areas where manure **can never be applied** (prohibited):
    ____________________________    ____________________________    ____________________________
**Right Rate.** Two things a manure applicator needs is 1) a **field map** that includes where manure is to be applied and 2) **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, the slope of the field, the crops to be grown, the soil type and the type of manure.

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

**Important Note:** In Wisconsin, there are two type of farms: those that require a WPDES permit (also known as CAFOs, see page 11) and those that do not. There may be differences in how the administrative rules for nutrient management are applied to these two types of farms; the same field may have different setbacks depending on if the manure is from a CAFO or non-CAFO, **so it is important to understand and follow the specific map's rate and color legend for the fields that you are applying manure to.**

**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 surface run-off or leaching. For example:

- **Time and Place:** No winter applications are allowed in Surface Water Quality Management Areas (SWMQAs). See page 9 for more information about SWMQAs.
- **Time and Rate:** In winter, liquid manure application rate is limited to 7,000 Gal/A. For some fields with slopes greater than 6%, the application rate is limited to 3,500 Gal/A (or 30 lb P₂O₅, whichever is less). And on CAFOs, there are additional winter restrictions.

*Remember that each farm you make applications to will have its own unique nutrient management plan. It is vital that you understand and follow the specific instructions and maps that you are given.*

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

________________________  __________________

13. List two ways that you can adjust the application rate on a calibrated spreader:

________________________  __________________

14. All farms have similar nutrient management plans.  ☐ True  ☐ False
Blue-lined areas: SWQMA

Note: SWQMA is often pronounced as swik-muh.

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 1,000 ft. For CAFOs, there are additional application restrictions for SWQMAs.

Red areas with black lines:

**Winter manure prohibited areas**

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

*When is winter?* Winter conditions are defined as having frozen or snow-covered soils (for CAFOs, greater than 1” of snow) that prevent effective incorporation at the time of application.

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. In some cases fertilizer is also prohibited.

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

16. All nutrient prohibited areas have the exact same prohibitions.  ☐ True  ☐ False
Using the map above, answer the following questions:

17. What fields have **winter manure prohibited areas**? _____ _____ _____

18. What fields do not have winter manure prohibited areas? _____ _____ _____ _____

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

20. How many **nutrient prohibited areas** are on the map? ________
Manure Regulations for CAFOs

A CAFO is an confined 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 Wisconsin 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. CAFOs must follow the DATCP rules, DNR NR 243 and NRCS 590 Nutrient Management Standard, including but not limited to:

- 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 with additional restrictions for solid manure on frozen ground prior to February 1st
- No spreading of manure within 100 feet of a private well and 1,000 feet from a community well
- No manure spreading on soils with a depth to bedrock less than 24 inches or soils with groundwater within 24 inches of the surface

**IMPORTANT NOTE:** CAFOs have additional restrictions when making applications in a SWQMA (including intermittent streams). Each farm selects from multiple strategies for applying manure in a SWQMA, so you must follow the specific instructions and maps for the farm that you are making applications on. As stated on page 9, CAFOs will have additional map layers and colors for these restrictions.

There are many other spreading restrictions not listed here, so you must follow the maps and instructions for the specific farm that you are making applications on.

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

22. 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

23. Every load of manure spread for a CAFO farm must be documented.  [ ] True [ ] False

24. When spreading manure for a CAFO farm, how far away must you stay away from a private well (if it is not a Karst area, see page 12 for Karst information)? __________ feet

25. All CAFOs use the same strategy for applying manure in a SWQMA.  [ ] True [ ] False

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**Animal units equivalent examples**

For example, one milk cow is equal to 1.43 animal units, remember a CAFO has 1,000 AUs or more. Below are some examples of how many animals in an operation are necessary to be considered a CAFO.

- 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
What is a Karst area?
Simply put, a Karst area is where there are shallow soils over fractured carbonate bedrock.

What does Karst mean for me?
In 2018, Wisconsin implemented new regulations (NR 151) in the 15 counties closest to Lake Michigan. Although similar karst type features exist in the counties closest to the Illinois, Iowa and Minnesota border (south of and including Polk County), the new regulations only apply on the eastern side of Wisconsin.

But good manure management practices in all Karst areas is a good idea because snowmelt and rainwater move through the thin soils into these fractures, carrying nutrients, pathogens and contaminants with it. **Manure applicators need to take special precautions to reduce the risk of contaminating wells.**

Recognizing Karst in the field
Karst features are often hidden by soil or may be downslope in a neighboring field.

- Sinkholes are spots where soil has washed into a crack. Often farmers filled these with rock. In some cases, streams disappear into sinkholes.
- Fractures are cracks that allow water to enter the groundwater. In dry seasons, plants tap into the soil in the cracks, and you can see the pattern in alfalfa growth.

NR 151 Karst regulations

- Well setbacks **increase** to 250 ft for a private well and 1,000 feet of a community/municipal well.
- Complete setbacks should be included in the nutrient management plan.

Some of the regulations vary based on soil thickness.

- **Less than 5 feet of soil:** Depth to rock must be verified prior to application on fields
- **Less than 2 feet of soil:** No manure applications
- **2-3 feet of soil:** Pre-till and incorporate/injection no deeper than 4 inches (liquid), rates limited to 15 tons, or manure treatment required
- **3-5 feet of soil:** Same as 2-3 ft, except injection depth limited to 6 inches

Some Tips for Taking Manure Samples

Manure nutrients can vary significantly throughout a manure storage system:

- Agitation can greatly reduce nutrient variability

Composite sampling is recommended for each emptying session:

- A minimum of 10 sub samples is recommended to make a composite sample
- A composite sample should be taken for each emptying event (this could be a day or a few days, or when the practices and therefore the manure characteristics change significantly)
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.

**Main Components of the WI Manure Management Advisory System**

- Runoff Risk Advisory Forecast
- SnapMaps 590/NR243 Maps
- SnapPlus Nutrient Management Software ([snapplus.wisc.edu](http://snapplus.wisc.edu))
- DATCP NM Planning
- DATCP Geodata

**Runoff Risk Advisory Forecast (RRAF)**

The runoff forecast provides maps showing short-term runoff risk for daily application planning, taking into account factors including soil moisture, weather forecast, crop cover, snow cover and slope. It is updated three times daily by the National Weather Service. The data is based on a system using four-kilometer grids (1.5 square mile), allowing users to look at conditions at a very local level.

The **RRAF is not a regulatory tool** but rather a tool to assist in assessing the risk of nutrient application runoff.

The map displays the runoff risk not just for the current day, but 72 hours into the future based on precipitation model forecasts. In the winter, the model looks out up to 10 days using the temperature forecast to predict snowmelt. This ‘look ahead’ allows better planning of manure and other nutrient applications. A few things to keep in mind:

- Assess the risk for the actual field before an application
- Even low risk fields may not be dry enough to spread
- Risk increases with soil moisture
- Some fields are always higher risk areas
Handling a Manure Spill

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

26. 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 manure that reaches a stream or pond
☐ d. All of the above

27. You are an employee and are applying manure in a field and a spill occurs; match the correct task to the spill response number.

1_______ a. Begin the cleanup
2_______ b. Call the DNR or appropriate agency
3_______ c. Control the spill by turning off the pumps
4_______ d. Determine the best way to contain the spill (plow, chisel, berm)
5_______ e. Fill out documentation and paperwork
6_______ f. 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.

Report manure spills immediately! Call the 24-hour spill emergency hotline: 1-800-943-0003
Spill Response and Public Relations

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

28. 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 should you respond to this issue?**

29. 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 a well. **How should you respond to this issue?**

Route Planning

30. Given the map on the left, what would the best route from the farm to field 3 (draw the route directly on the map)?

31. What road features should you avoid when you have a full load?

32. Should you take a different route back, if so, what route should you take?
Some Resources for Making Healthy and Safe Choices at Work

National Institute for Occupational Safety and Health
https://www.cdc.gov/niosh/topics/truck/health.html

Healthy Practices to Prevent Fatigue and Obesity:
- Get more than seven hours of sleep a night
- Drink more water
- Increase physical activity
- Increase intake of omega-3 fatty acids (nuts/seeds, plant oils, fortified foods (some eggs), yogurt, juices, milk)
- Lose extra weight by cutting down on portion sizes and trying to eat a well-balanced diet
- Eat smaller meals more often during the day to help steady your blood sugar level

Before bed, avoid:
- Heavy or spicy meals
- Liquids, especially alcohol or caffeine
- Nicotine and other stimulants
- Light exposure from television and electronics

Physical Activity Guidelines for Americans:
Department of Health and Human Services

Key Guidelines for Truck and Tractor Drivers:
- Move more and sit less throughout the day when possible
- Some physical activity is better than none
- Step out of the truck between loads to inspect semi and tanker (check tires, lights, etc.)
- Walk around when you are not driving (shutdowns, field switching, breakdowns)
- Physical activity has immediate health benefits, like reducing anxiety and blood pressure, or improving the quality of sleep and insulin sensitivity
- More physical activity = more health benefits
- Exercise before or after work
- Engage in at least 2.5–5 hours/week of moderate-intensity physical activity
- Do muscle strengthening activities of moderate or greater intensity 2+ days/week

USDA ChooseMyPlate.gov
https://www.choosemyplate.gov/myplate-mywins-tips-hacking-your-snacks

Hacking Your Snacks:
- Build your own: Make your own trail mix with unsalted nuts and add-ins such as seeds, dried fruit, popcorn, or a sprinkle of chocolate chips
- Prep ahead: Portion snack foods into baggies or containers when you get home from the store so they’re ready to grab-n-go when you need them
- Make it a combo: Combine food groups for a satisfying snack—yogurt and berries, apple with peanut butter, whole-grain crackers with turkey and avocado
- Eat vibrant veggies: Spice up raw vegetables with dips. Try dipping bell peppers, carrots, or cucumbers in hummus or guacamole
- Snack on the go: Bring ready-to-eat snacks when you’re out. A banana, yogurt (in a cooler), or baby carrots are easy to bring along and healthy options