BUREAU OF WATERSHED MANAGEMENT
PROGRAM GUIDANCE

Nonpoint Source Program

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Chapter NR 151 Implementation Series: Determining Direct Runoff from Feedlots to Waters of the State

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Notice: 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. 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.

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Statement of Problem Being Addressed

The Department of Natural Resources (Department) has promulgated rules prescribing performance standards and prohibitions for agricultural facilities and agricultural practices that are nonpoint sources as authorized by s. 281.16(3)(a) Wis. Stat. These rules are promulgated at subch. II of ch. NR 151 Wis. Admin. Code. The department generally relies on County land and water conservation staff to evaluate water quality impacts from livestock operations and compliance with the agricultural performance standards and manure management prohibitions. One provision is found at s. 281.16(3)(a)3. Wis. Stat. and s. NR 151.08(4) Wis. Adm. Code which prohibits "direct runoff from a feedlot . . . into the waters of the state or to a direct conduit to ground water" by a livestock operation. Conservation partners within Wisconsin's nonpoint source pollution abatement program requested the Department develop guidance for determining when direct runoff from a livestock operation to waters of the state occurs. Determining when direct runoff from a livestock operation to waters of the state occurs is a fact-specific, case-by-case process. This guidance provides factors that may be considered when making such a determination.

Background and Definitions

The Department relies on local municipalities such as county land and water conservation departments to implement and enforce Wisconsin's agricultural performance standards and prohibitions. County conservation staff are equipped with the appropriate technical and conservation planning skills to assist landowners with livestock operation evaluations and with the implementation of needed best management practices to meet the performance standards and prohibitions. Compliance with the agricultural performance standards and prohibitions is a factor in determining eligibility for participation in certain state and local grant programs. These programs include Livestock Facility Siting, Farmland Preservation, Targeted Runoff Management grants, Notice of Discharge grants, Soil and Water Resource Management grants, and local ordinances. For example, a discharge such as a direct runoff must have occurred before the department may issue a Notice of Discharge grant or a Targeted Runoff Management Grant. The goal of these grant programs is to provide the cost sharing required to implement best management practices to prevent a direct runoff.

This guidance focuses on evaluation of direct runoff from feedlots (as is defined at s. NR 151.015(7)(a)) and not direct runoff from stored manure and manure storage (as defined at ss. NR 151.015(7)(b-d)). Specifically, direct runoff from a feedlot is runoff "that can be predicted to discharge a significant amount of pollutants to surface waters of the state or to a direct conduit to ground water."

The following definitions apply to the feedlot prohibition and provide the background for guidance implementation.

Definition
"Direct conduits to groundwater" *mean wells, sinkholes, swallets, fractured bedrock at the surface, mine shafts, non-metallic mines, tile inlets discharging to groundwater, quarries, or depressional groundwater recharge areas over shallow fractured bedrock, s. NR 151.02(11m).*
"Direct runoff" *includes runoff from a feedlot that can be predicted to discharge a significant amount of pollutants to surface waters of the state or to a direct conduit to ground water. s. NR 151.015(7)(a), Wis. Adm. Code*
"Feedlot" *means a barnyard, exercise area, or other outdoor area where livestock are concentrated for feeding or other purposes and self-sustaining vegetative cover is not*

maintained. "Feedlot" does not include a winter grazing area or a bare soil area such as a cattle lane or a supplemental feeding area located within a pasture, provided that the bare soil area is not a significant source of pollution to waters of the state, s.NR 151.015(8).
***"Livestock facility"** means a structure or system constructed or established on a livestock operation, s. NR 151.015(9).*
***"Livestock producer"** means an owner or operator of a livestock operation, s.NR 151.015(10).*
***"Livestock operation"** means a feedlot or other facility or a pasture where animals are fed, confined, maintained or stabled, s. 281.16(1) (c), Wis. Stats.*
***"Process wastewater"** means wastewater from the production area directly or indirectly used in the operation of animal feeding operation that results from any or all the following:* *(a) Spillage or overflow from animal or poultry watering systems.* *(b) Washing, cleaning, or flushing pens, barns, manure pits, or other animal feeding operation facilities.* *(c) Direct contact swimming, washing, or spray cooling of animals or dust control.* *(d) Water that comes into contact with any raw materials or animal byproducts including manure, feed, milk, eggs or bedding.* *s. NR 151.015(16), by reference s. NR 243.03(53) Wis. Adm. Code*
***"Site that is susceptible to groundwater contamination"** under s. 281.16(1)(g), Stats., means any one of the following:* *(a) An area within 250 feet of a private well.* *(b) An area within 1000 feet of a municipal well.* *(c) An area within 300 feet upslope or 100 feet down slope of karst features.* *(d) A channel with a cross–sectional area equal to or greater than 3 square feet that flows to a karst feature.* *(e) An area where the soil depth to groundwater or bedrock is less than 2 feet.* *(f) An area where the soil does not exhibit one of the following soil characteristics:* *1. At least a 2–foot soil layer with 40% fines or greater above groundwater and bedrock.* *2. At least a 3–foot soil layer with 20% fines or greater above groundwater and bedrock.* *3. At least a 5–foot soil layer with 10% fines, or greater above groundwater and bedrock*
***"Surface waters"** means all natural and artificial named and unnamed lakes and all naturally flowing streams within the boundaries of the state, but not including cooling lakes, farm ponds and facilities constructed for the treatment of wastewaters, s. NR 102.03(7), Wis. Adm. Code.*
***"Waters of the state"** means those portions of Lake Michigan and Lake Superior within the boundaries of Wisconsin, all lakes, bays, rivers, streams, springs, ponds, wells, impounding reservoirs, marshes, water courses, drainage systems and other surface water or groundwater, natural or artificial, public or private within the state or under its jurisdiction, except those waters which are entirely confined and retained completely upon the property of a person, s. 283.01 (20), Stats.*

Discussion

Section NR 151.08 (4) Wis. Admin. Code prohibits "direct runoff from a feedlot or stored manure into the waters of the state," where direct runoff includes in its definition "runoff from a feedlot that can be

predicted to discharge a significant amount of pollutants to surface waters of the state or to a direct conduit to ground water." At issue in determining whether there is direct runoff from a feedlot is whether the direct runoff "can be predicted to discharge a significant amount of pollutants." This raises two questions: (1) how to establish that runoff containing pollutants can be predicted; (2) if runoff containing pollutants is predicted, how to predict whether it will be a significant discharge of pollutants vs one that is not significant. Underlying this determination is also the question of what factors should be used to determine the likely significance of a discharge of pollutants.

Although not directly applicable to discharges of manure from a feedlot, ch. NR 151 does provide factors which must be considered when determining whether a discharge of process wastewater is significant. It is reasonable to consider similar factors when reviewing discharges of manure from a feedlot to determine whether there is a direct runoff. The factors for determining whether a discharge of process wastewater is significant are found at NR 151.055(3) Wis. Admin, Code and are as follows:

(a) Volume and frequency of the discharge.
(b) Location of the source relative to receiving waters.
(c) Means of process wastewater conveyance to waters of the state.
(d) Slope, vegetation, rainfall, and other factors affecting the likelihood or frequency of process wastewater discharge to waters of the state.
(e) Available evidence of discharge to a surface water of the state or to a direct conduit to groundwater as defined under s. NR 151.002 (11m).
(f) Whether the process wastewater discharge is to a site that is defined as a site susceptible to groundwater contamination under s. NR 151.015 (18).
(g) Other factors relevant to the impact of the discharge on water quality standards of the receiving water or to groundwater standards.

A decision by the U.S. Supreme Court (*County of Maui vs. Hawaii Wildlife Fund*)[1] is also relevant to identifying factors to consider when determining a direct discharge. In *Maui*, the Court held that for permitting purposes under the NPDES program, a discharge of pollutants required permitting if it was the functional equivalent of a direct discharge from the point source into navigable waters. The Court outlined some factors that would be relevant to determining if a discharge was the functional equivalent of a direct discharge. These factors are: (1) transit time, (2) distance traveled, (3) the nature of the material through which the pollutant travels, (4) the extent to which the pollutant is diluted or chemically changed as it travels, (5) the amount of pollutant entering the navigable waters relative to the amount of the pollutant that leaves the point source, (6) the manner by or area in which the pollutant enters the navigable waters, (7) the degree to which the pollution (at that point) has maintained its specific identity. Although not directly applicable to interpreting what direct runoff means under s. NR 151.08 (4) Wis. Admin. Code, the Court's analysis provides guidance that is reasonable to apply here.

Determining whether there is direct runoff from a feedlot requires a site-specific analysis and a subjective decision based on observed facts and the best technical judgement of the inspector. There is no single criterion that can be used to make such a determination, rather there are common factors, observation of which can support a prediction that a discharge of a significant amount of pollutants to waters of the state will occur.

For determining whether a discharge can be predicted, direct observations of current or past discharges are the priority if such can be obtained. Direct evidence has a high degree of credibility, in part because

[1] *Cty. of Maui, Hawaii v. Hawaii Wildlife Fund*, 140 S. Ct. 1462 (2020)

it is firsthand knowledge and provides more certainty by eliminating any need to reason. In the absence of direct observation, indicia of discharge can provide sufficient facts on which to base a prediction that a discharge will occur but may be less persuasive than direct observations. For example, observations of an eroded concentrated flow channel from a feedlot to a water of the state with manure solids in it, is a good indication that a discharge can be predicted. However, it is not as persuasive as observation of an on-going discharge including photographs of manure flowing in a channel from a feedlot to a water of the state. Both may be sufficient to predict that a discharge will occur, but the direct observation is more persuasive because it takes away the need to reason that the manure solids in the channel would discharge to the water of the state under conditions when there is flow.

A decision on whether there is direct runoff should be based on a preponderance of the factual evidence, the factual evidence should be credible and lead the investigator to the most likely conclusion. It is not necessary that the determination be the only possible conclusion, just the most likely one in the technical judgement of the inspector. Also, it is not necessary that the decision is supported by the most evidence, rather by the most persuasive evidence. This guidance document will identify the types of observations which can be used to support predictions of discharge

Factors to Consider in Predicting Direct Runoff and its Significance

As outlined above, NR 151.055(3) Wis. Admin. Code and the U.S. Supreme Court's decision in *Maui* provide factors which are appropriate for use as a framework for making significance determinations under s. NR 151.015(7)(a), Wis. Adm. Code on a case-by-case basis. These factors are:

(a) Volume and frequency of the runoff from the feedlot.
(b) Location of the source of the runoff from a feedlot relative to receiving waters.
(c) Means of direct runoff conveyance from a feedlot to waters of the state.
(d) Slope, vegetation, rainfall, and other factors affecting the likelihood or frequency of runoff to waters of the state.
(e) Available evidence of runoff from the feedlot to a surface water of the state or to a conduit to groundwater as defined under s. NR 151.002 (11m).
(f) Whether the runoff from the feedlot is to a site that is defined as a site susceptible to groundwater contamination under s. NR 151.015 (18).
(g) Other factors relevant to the impact of the discharge on water quality standards of the receiving water or to groundwater standards.

Operations which can support Predicting Direct Runoff and its Significance

In the section that follows, the types of observations which might be used to support each of the factors listed above are outlined.

A. Any on-going actual discharge at the time of inspection.
    1. The source, path, and location of the discharge point. If possible, follow the flow path from source to discharge point and take photographs. Sketch the flow path on a map or aerial photograph.
    2. An estimation of the volume and frequency of the discharge.
    3. An estimation of the concentration of pollutants in the discharge.
        a. Sample the discharge along the flow path.
        b. Sample the receiving water upstream and downstream, of the discharge.
    4. Record any observations of environmental impact to the water of the state.
        a. Dead fish.

b. Animal waste smell in water downstream.
c. Discolored water downstream.
d. Foam in downstream water.
e. Mixing zones.

B. If no on-going discharge, available evidence of past direct runoff.
   1. Evidence of flow paths for discharge.
      a. Channelized flow leaving pollutant source.
      b. Erosion within the flow path.
      c. Stressed or "burned out" vegetation in the flow path.
   2. If possible, follow the flow paths from source to receiving water.
   3. Observations of manure solids in the flow path.
   4. Observations of manure solids in the receiving water.
   5. Environmental impacts in the flow path or receiving waters.
      a. Stressed or "burned out" vegetation in the flow path.
      b. Discolored sediment/substrate near the discharge point.
   6. Observations of changes within the waterbody.
      a. Changes to habitat characteristics of plants and animals.
      b. "Slime" on water surface.
      c. Increased algal growth.

C. Other Factors to relevant to a prediction of discharge to waters of the state.
   1. Feedlot characteristics.
      a. Presence and effectiveness of any runoff controls.
      b. Specific type of lot surfacing material and condition (asphalt, concrete, earthen, crushed stone).
      c. How the surfacing material was constructed if applicable or known (i.e. was rebar used, thickness, etc.).
      d. Feedlot dimensions also noting dimensions among different surfacing materials.
      e. Presence of, type of, and condition of any walls or containment around the feedlot.
      f. How does the runoff leave the lot (i.e. through a designed sediment basin, via a slotted wall, just out an open side, etc.).
      g. Time of year (growing season vs. winter).
   2. Assess animals on the feedlot
      a. Types
      b. Size/weight
      c. Numbers
      d. Animal time on the lot (i.e. hours, days, and seasons)
      e. Consistency of manure/waste characterization. The type of feed/forage directly influences the consistency of the manure. For example, is it dry hay or high energy TMR?
   3. Run-on to a feedlot and contributing areas or upstream features.
      a. Identify roof areas contributing runoff to the feedlot.
      b. Identify and characterize other contributing tributary areas upstream of or adjacent to the feedlot that could carry nutrients or contaminants offsite. Note items such as hydrologic features needed to delineate drainage areas including slopes, slope lengths, and surface types for assigning runoff curve numbers as appropriate.
      c. Type of flow onto the feedlot (i.e. sheet flow or concentrated flow).

4. Assess the direct runoff flow path from the feedlot to the end of the flow path or the nearest waters of the state.
    a. Inform the landowner that the site visit may require following the flow path of runoff to waters of the state.
    b. Identify downstream water bodies or confirm water bodies determined with mapping tools where appropriate. Water bodies include those listed in the waters of the state definition. Note any classification such as Class I trout steam, outstanding natural resource waters, other designated use?
    c. Identify the flow path to potential downstream water bodies noting whether it's on the surface or subsurface such as through a tiling system. If a tile is present note whether there is a surface inlet or in-field tile line.
    d. Document flow path characteristics including cover type and identify whether the flow is channelized (i.e. a defined cross section), shallow concentrated (i.e. no defined cross section but may include large rills and shallow "V" depressions in the ground surface or otherwise have a depth of 0.1 to 0.5 feet), or sheet flow (i.e. shallow, uniform depth of approximately 0.1 feet or less).
    e. Calculate or estimate the slope of the flow path. Occasionally multiple slopes must be calculated to accurately define the flow path.
    f. Document any obstacles that could potentially deter the flow of pollutants such as impoundments or buffers whether designed and intentional or naturally occurring. Areas identified with sheet flow as described above are likely buffers. For buffers, approximate the dimensions, particularly the width that contributes to effective buffering with sheet flow conditions.
5. Assess feedlot management
    a. Feeding locations and methods.
    b. Cleaning methods and frequency.
6. Presence of manure/contaminated runoff
    a. Look for any visible presence of manure runoff, including whether manure solids are leaving the lot and directly running off into waters of the state.
    b. Look for indicators of manure runoff such as burned vegetation.
    c. Determine the distance that evidence of runoff can be followed below the site.

Post-Visit Analysis

Follow-up after a site visit may be helpful in properly documenting the site visit. The post-visit analysis uses the information collected during the site visit to make a determination of direct runoff. Depending on what was observed during the site visit, some of the items below may be needed for making a determination of a "predicted discharge to waters of the state."

A. *Evaluate existing BMPs.* Existing BMPs can be compared to the current respective technical standards whether they were designed to standards or not, to determine their effectiveness of preventing direct runoff from feedlots to waters of the state. If designed to technical standards, consider whether the operation and maintenance plan has been followed to keep the BMP functioning properly. The following are some examples where NRCS technical standards can be used to evaluate existing BMPs:

1. *NRCS technical guide vegetated treatment area standard 635* lists physical limitations and the varying types of buffer areas that can be considered for treating runoff from different waste sources.

2. *NRCS technical guide waste storage facility 313* establishes minimum allowable limits for design parameters, acceptable installation processes, or performance requirements. Manure storage facilities and total capture runoff systems from feedlots may be evaluated to this standard.

B. *Evaluate the feedlot runoff flow path.* Channelized flow increases the likelihood of contaminated runoff reaching waters of the state, while sheet flow may provide more opportunities for nutrient uptake, volatilization, dilution and deposition. A lower flow path slope and/or flow obstacle would allow for better infiltration and nutrient uptake by any vegetation present in the flow path. Determining the slope will also assist with designing a future BMP if necessary.

C. *Use of models.* Modeling is not necessary for livestock facilities where a visual discharge is apparent during the site visit or has been documented through photographs, water samples, or other means. Where appropriate, use models such as the Barnyard Evaluation Rating Tool (BERT) and Wisconsin Barnyard Runoff Model (BARNY) or other appropriate phosphorus and/or nitrogen loading models as they become available to support site visit findings.

Although modeling tools are intended as ranking tools rather than an accurate method to calculate pollutant loadings, they may be considered as support for decisions made through best professional judgement.

References

For additional information on determination of compliance with the agricultural performance standards and prohibitions, refer to the following:

- Chapter NR 151, Wisconsin Administrative Code
- Chapter NR 243, Wisconsin Administrative Code
- Chapter ATCP 50, Wisconsin Administrative Code
- Chapter ATCP 51, Wisconsin Administrative Code
- USDA NRCS Wisconsin Conservation Practice Standards

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