WASHINGTON STATE DEPARTMENT OF ECOLOGY

FUGITIVE DUST CONTROL GUIDELINES FOR BEEF CATTLE FEEDLOTS

AND

BEST MANAGEMENT PRACTICES

Air Quality Program
Department of Ecology

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BACKGROUND

Introduction

A beef cattle feedlot is a facility at which cattle are confined throughout the year, and fed high energy rations for the eventual purpose of marketing. While there are dozens of small feedlot operations in Washington State, the Department of Ecology has recognized beef cattle feedlots with inventories of over 1,000 head as potential air pollution sources since the initial adoption of registration regulations in 1976. There are several feedlots located in eastern and central Washington which support normal inventories in excess of 1,000 head. Ecology's primary air quality concern regarding feedlots is the generation of fugitive dust emissions from feed pens, roads, and alleyways.

During the hot, dry weather typical in central and eastern Washington during the summer months, cattle are lethargic during the heat of the day. When temperatures drop in the evening, the cattle become active and have the potential to generate significant quantities of fugitive dust from pens. Vehicle traffic on unpaved roads and cattle movement in alleys can also contribute to fugitive dust emissions from feedlots. This dust may impact neighboring properties, and Ecology and local air pollution control authorities have received complaints from feedlot neighbors regarding fugitive dust.

In recent years, most feedlot operators have instituted various practices to control fugitive dust emissions. Fugitive dust control measures can require a significant commitment of time and resources by feedlot owners and operators.

Washington Administrative Code (WAC) 173-400-040 requires air pollution sources to take "reasonable precautions" to prevent the release of fugitive emissions. Since particulate emissions from feedlots are considered to be fugitive dust emissions, these guidelines are intended to use existing regulations and clarify what constitutes "reasonable precautions" to minimize emissions of fugitive dust from feedlots. The primary mechanism for doing this is to identify best management practices (BMPs) for fugitive dust control and implement these practices according to flexible, site-specific fugitive dust control plans developed by each feedlot and approved by Ecology or the appropriate local air authority.

GUIDELINES

I. What is the Purpose of the Guidelines?

The purpose of these guidelines is:

- To achieve sufficient control of fugitive dust emissions and fallout from cattle feedlots to ensure compliance with state laws and regulations.
- To achieve dust control by describing a menu of best management practices (BMPs) for cattle feedlots which will be implemented through the use of flexible, site-specific fugitive dust control plans.
- To clarify what constitutes "reasonable precautions to prevent" emissions of fugitive dust as required by WAC 173-400-040(3) and WAC 173-400-040(8)(a).
- To educate feedlot owners and operators on effective management of fugitive dust control measures and provide a means by which cattle feedlots can demonstrate that they are taking reasonable precautions to protect the quality of Washington's air.

II. Who Needs to Comply with the Guidelines?

- All cattle feedlots with inventories of over 1,000 head of cattle confined and fed during the dry season must comply with these guidelines.
- These guidelines may also be followed for resolving fugitive dust emission problems which may arise from feedlots with smaller inventories.

III. How do the Guidelines Work?

- Cattle feedlot operators will prepare fugitive dust control plans for each feedlot and submit them to Ecology or the appropriate local air authority for approval.
- A feedlot's plan must identify best management practices (BMPs) and operational procedures which the feedlot proposes to use to control fugitive dust.
- Ecology or the local air authority and the feedlot are expected to work together in good faith toward development of a dust control plan which is acceptable to both the feedlot and the appropriate agency.
- Feedlots will implement approved fugitive dust control plans according to the criteria and/or implementation schedules outlined in their plans.
- A feedlot may make modifications to an approved fugitive dust control plan as long as the effectiveness of the plan is not compromised.

- Ecology or the local air authority may initiate negotiations with a feedlot to modify an approved plan, if that plan is not sufficiently effective in minimizing fugitive dust emissions.

IV. Where and When Should Dust Control Plans be Filed?

- Feedlots located within the boundaries of a local air authority should submit plans to the authority.

- Feedlots located outside the boundaries of a local air authority should submit plans to the appropriate Department of Ecology Regional Office.

- Existing feedlots will submit plans within four months of the effective date of the guidelines, unless a later date is agreed upon by Ecology or the local air authority.

- New or expanding feedlots will file a notice of construction which includes a fugitive dust control plan for the new facility or addition. This plan must be approved prior to construction.

V. What must be in a Feedlot's Dust Control Plan?

1. A description of the feedlot, including:

   - a map or drawing of the feedlot which adequately represents the layout of the feedlot and provides enough detail to allow Ecology or the local air authority to adequately review the feasibility and appropriateness of various BMPs for the facility. The map or drawing should show all:

     1) pens;
     2) feeding bunks;
     3) alleyways; and
     4) roads

     Where representations of the smaller features of a feedlot are impractical, descriptions of these features may be footnoted.

   - a description of the operational capacity of the feedlot, including the maximum number of cattle which could be confined.

   - a description of the water available to the feedlot for dust control. This description should include the source and quantity of water available, and any permit or other limitations which would impact the feedlot's ability to employ water application as a BMP.

   - a description of site-specific features or characteristics which could complicate or prevent implementation of particular BMPs. For example: pens built on bedrock may inhibit installation of underground sprinkling systems, or narrow alleys may prevent water application by truck for portions of a facility.

2. A description of BMPs to be used under the plan.

Both existing and newly-proposed BMPs for control of dust from cattle pens, sorting alleys, feed alleys, and other roads should be described. Descriptions must include:

- which BMP or BMPs will be used, where they will be used, and what percentage of the facility they will be applied to;

- a description of the equipment and materials to be used, including a description of the normal operational capacity or application rate of any equipment;

- an operational plan for implementing each BMP.

  The operational plan should describe how the feedlot will implement BMPs and the conditions or criteria the feedlot will use to determine when and how to implement each BMP.

  It is recognized that feedlot operations and conditions are variable and that the same BMP may be implemented differently by individual feedlots. This variability makes the description of how BMPs will be operated, an especially important component of a feedlot's fugitive dust control plan.

  The operational plan must describe the criteria the feedlot will use to determine when to implement each BMP and the criteria for selecting application rates, if applicable. Examples of criteria include:

  1) pen conditions --- such as moisture, surface compaction, amount of loose material, mound condition, etc.;
  2) recent weather;
  3) forecasted weather; and
  4) cattle inventory

- identification of a contact person at the facility who is knowledgeable about the BMPs in the feedlot's dust control plan and their implementation.

3. A schedule of future BMP implementation, if applicable.

If a feedlot intends to implement an additional BMP or BMPs in the future, a target date for implementation of the future BMPs should be included in the feedlot's fugitive dust control plan.

For example: If Feedlot A intends to install a sprinkler system to cover a portion of their facility, but cannot afford the capital expense of the system for some period of time, Feedlot A's fugitive dust control plan should describe the measures to be used to control dust until the sprinklers are operational and provide a target date for installation of the sprinkler system.

VI. How are Plans Developed and Approved?

- A cattle feedlot is responsible for preparing a fugitive dust control plan and submitting the plan to Ecology or the appropriate local air authority for approval. Agricultural extension agents, consultants or other assistance may be used in developing and reviewing the plan.

- Within 30 days, Ecology or local air authority staff review the plan and notify the feedlot of plan approval or request additional information or propose alternative practices to approve the plan.

- Feedlots respond to agency requests for information or modification of the plan within 30 days.

- The approval process may include good faith discussion, evaluation, collection of information, and other efforts to resolve differences of opinion about the plan, so long as reasonable progress toward the development and approval of the feedlot's fugitive dust control plan is being made.

  The purpose of good faith negotiation is to share information and resolve differences of opinion regarding a feedlot's fugitive dust control plan. Both the feedlot and Ecology or the local air authority need to be able to exchange information freely and in good faith. Information obtained by Ecology or the local air authority in the course of negotiation is not obtained for the purpose of any future enforcement activity.

- If agreement on a feedlot's fugitive dust control plan cannot be reached after thorough good faith evaluation of alternatives and consideration of plan effectiveness, costs, and other pertinent matters, Ecology or the local air authority may initiate compliance action under RCW 70.94, WAC 173-400, or applicable local air regulations.

VII. How Can Changes be Made to an Approved Plan?

- A feedlot may make modifications to an approved fugitive dust control plan as long as the effectiveness of the plan is not compromised. Changes to a plan must be documented and Ecology or the local air authority must be notified of the changes. Modifications include but are not limited to:

  - discontinuance or addition of any equipment
  - changes in use of equipment
  - changes in operational procedures
  - changes in criteria used to determine BMP implementation and application rates

VIII. How Does an Agency Determine When a Dust Control Plan is Adequate?

In considering whether a dust control plan achieves the purpose of the guidelines, Ecology or local air authorities may consider:

- whether the plan utilizes BMP's identified in Section X of these guidelines
- consistency between the proposed BMP's and the BMP's outlined in the guidelines
- the extent of use and effectiveness of a proposed measure in reducing dust at other feedlots
- the ability of the proposed BMPs to maintain conditions which adequately minimize emissions
- other measures in the plan which may be effective in minimizing fugitive dust, but which are not recognized BMPs
- the adequacy of the operational plan, including the criteria used to begin, end and apply the proposed BMPs

IX. How Will Compliance with the Plan and Effectiveness of the Plan be Determined?

Compliance

After a fugitive dust control plan has been approved, a feedlot may be inspected to determine if the BMPs and their operational plans are in effect.

Effectiveness

After the plan is in place, inspection results may be used to evaluate the effectiveness of the plan in reducing fugitive dust.

If inspections indicate that the plan is not effective, Ecology or the local air authority will request information from the feedlot or propose additional or alternative dust control measures. As with the development of the initial plan, Ecology or the local air authorities and the feedlot will work together in good faith to revise the fugitive dust control plan to increase its effectiveness.

X. Description and use of Best Management Practices

General Principles

- A dust control plan may modify the design or operation of BMP's from the systems described below as long as their effectiveness is not compromised.

- The principle mechanism by which most of these BMP's operate is to maintain pen, alley, and roadway conditions which prevent loose particles from become airborne as fugitive dust.

Best Management Practices

1. Fixed Water Application - Sprinklers

Description

Sprinklers are installed throughout the cattle pens to apply water to the pen surface to prevent dust from becoming airborne. Sprinklers must be designed and installed to allow maximum practical coverage of the pen area and be capable of applying adequate amounts of water to control fugitive dust. Sprinkler systems can provide uniform pen coverage under favorable weather conditions (low wind). High winds can reduce the effectiveness of sprinkler systems.

High and low pressure sprinkler systems may be used to control fugitive dust. High pressure systems use fewer sprinkler heads under greater pressure to achieve pen coverage. Low pressure systems generally use a higher number of heads at a lower pressure. System cost and a feedlot's pen layout and characteristics are factors which will affect the choice of system. To effectively use any sprinkler system, pre-planning of water application is needed. Sprinklers can be fitted with automated control systems to minimize the labor required to operate the system. Sprinkler systems require varying degrees of maintenance to ensure their effectiveness.

Factors to Consider in Selecting Fixed Water Application as a BMP

- Availability of sufficient quantities of water to control dust
- Capital and operating costs for equipment
- Cost of water
- Water quality concerns, including potential for run-off
- Potential insect breeding and odor problems
- Selection of criteria for determining when to apply water and what application rates to use under variable conditions

2. Mobile Water Application - Water Trucks

Description

Trucks with water tanks and spray nozzles are driven through alleyways between feeding pens and water is applied to the pen surface to prevent dust from becoming airborne. Proper equipment and operation is necessary to obtain coverage sufficient to ensure that pen conditions are adequate to minimize generation of dust. Because large areas cannot be simultaneously covered by a water truck, the decision to apply water must be made early enough that there is sufficient start up time to achieve adequate coverage before fugitive dust becomes a problem. The feedlot must have sufficient equipment and an operational plan for its use which will allow coverage of the target area.

Water trucks may have a lower fixed cost than large sprinkler systems, but may also have higher operating costs due to the labor required to operate the truck and spray nozzles. A facility to refill water tanks is required. Maintenance of water trucks and spray equipment is critical to minimizing equipment breakdowns.

Water trucks are versatile and can be equipped to apply water to road and alleyways in addition to pens.

Factors to Consider in Selecting Mobile Water Application as a BMP

- Availability of sufficient quantities of water to control dust
- Capital and operating costs for equipment
- Cost of water
- Water quality concerns, including potential for run-off
- Potential insect breeding and odor problems
- Selection of criteria for determining when to apply water and what application rates to use under variable conditions
- Lead-time to achieve adequate coverage

3. Increasing Animal Density -- Cross fencing

Description

Increasing the density of cattle in a pen increases the moisture contribution to the pen from manure and urine. This increased moisture, in turn, reduces dust emissions. Increased cattle density can be achieved by using smaller permanent pens, increasing the number of cattle in a pen, or by temporarily cross fencing larger pens with electric wire, or with wood or metal panels. Animal density must be adequate to maintain pen conditions which will substantially minimize fugitive dust.

Cross fencing may have lower fixed and operating costs than sprinkler systems or water trucks. However, if cross fencing by itself cannot maintain adequate pen moisture to control dust, supplemental water may need to be applied. If water application is necessary, cross fencing will reduce the area needing coverage and generally shorten the time period during which water application may be needed.

Factors to Consider in Selecting Animal Density as a BMP

- Availability of cross-fencing material
- Cost of materials
- Labor cost to install and maintain cross-fences
- Criteria used to time installation is critical to success
- Ability to supplement with other BMPs, such as water application or pen maintenance
- Physical limitations such as location of livestock watering tanks

4. Pen Maintenance

Description

Removing manure from pens may reduce dust emissions by limiting the volume of loose material which can become airborne. If used in conjunction with water application, this practice may reduce the volume of water needed for dust control.

A feedlot must have an appropriate place to store or dispose of manure removed from pens.

Factors to Consider in Selecting Pen Maintenance as a BMP

- Size and number of pens
- Cost of labor and equipment
- Minimized disturbance of hard pan
- Control of dust during maintenance work
- Criteria used to time maintenance work is critical to success
- Ability to supplement with other BMPs, such as water application

5. Surface Amendments/Applications

Description

Spreading sawdust, apple pumace, or other materials over the surface of pens and alleyways provides dust control by adding texture or moisture to the surface of the pens or alleys or by increasing the compaction of the surface area. Application of organic material may be suitable mainly for alleyways. Application of certain types of flyash may also harden the manure surface in pens and further contribute to dust control.

As with pen maintenance, surface applications may be more successful and cost-effective at smaller feedlots. Costs of surface amendments or applications will be variable, but may be expensive if applied to large areas.

Factors to Consider in Selecting Surface Amendment as a BMP

- Size and number of pens
- Consistent availability of materials
- Cost of materials
- Cost of labor
- Criteria used to time maintenance work is critical to success
- Ability to supplement with other BMPs

6. Wet Manure/Mound Management

Description

Feedlots in the Pacific Northwest mound packed manure to aid in keeping animals dry and comfortable through the wet periods of the winter. As rain falls and the top few inches of the mounds become saturated, this wet material is scraped off and stock-piled (in the pens), revealing dry material underneath. This provides the cattle a dry area to bed down.

The stock-piled wet manure is spread back over the mound in the spring and summer and allowed to dry. This spreading of damp material throughout the pen can add moisture to the pen and aids in surface compaction.

Factors to Consider in Selecting Mound Management as a BMP

- Size and number of pens
- Cost of labor and equipment
- Mounding requirements/practices
- Criteria used to time maintenance work is critical to success
- Ability to supplement with other BMPs

7. Windbreaks

Description

Planting tall vegetation, such as poplar trees, along the edge of the feedlot may be effective in reducing the volume of dust which is carried away from the feedlot by prevailing winds.

Windbreaks depend on weather conditions for their effectiveness. Changes in wind direction will compromise the effectiveness of this practice.

Poplar trees take six years to reach mature heights and require substantial quantities of water to grow rapidly.

This practice has been untested with respect to controlling fugitive dust from feedlots, but has been effective in reducing emissions from other open dust sources.

APPENDIX A
STATUTORY AND REGULATORY BACKGROUND

This section is intended to provide the primary regulatory framework for cattle feedlots. Other sections of Washington Administrative Code 173-400 may apply, but the sections listed below have the most significant bearing on the industry.

WAC 173-400, **General Regulations for Air Pollution Sources**, contains several provisions that pertain to air emissions generated by feedlots, including the following:

1. WAC 173-400-040, **General standards for maximum emissions**, which includes restrictions on visible emissions, offsite particulate fallout, fugitive dust emissions, odors, and emissions detrimental to persons or property.

   1.1 WAC 173-400-040(1), **Visible emissions**, restricts emissions to no greater than 20% opacity for more than 3 minutes in any one hour period.

   1.2 WAC 173-400-040(2), **Fallout**, states in part "No person shall cause. . . the emission of particulate matter. . . to be deposited beyond the property under direct control. . . of the source in sufficient quantity to interfere unreasonably with the use and enjoyment of the property upon which the material is deposited."

   1.3 WAC 173-400-040(3), **Fugitive emissions**, requires the use of "reasonable precautions to prevent the release of air contaminants" from any source which is considered a source of fugitive emissions.

   1.4 WAC 173-400-040(4), **Odors**, requires recognized good practice to reduce odors to a reasonable minimum.

   1.5 WAC 173-400-040(5), **Emissions detrimental to persons or property**, states in part "No person shall cause. . . the emission of any air contaminant from any source if it is detrimental to the health, safety or welfare of any person, or causes damage to property of business."

   1.6 WAC 173-400-040(8)(a), **Fugitive dust sources**, requires the use of reasonable precautions to prevent fugitive dust from becoming airborne.

2. WAC 173-400-105, **Records, monitoring, and reporting**, allows the department to require facility specific information to determine compliance, monitoring data for air contaminants, and access to the facility for inspections.

3. WAC 173-400-110, **New source review**, requires departmental approval in the form of a regulatory order prior to the installation of a new air pollution source or installation of new or additional air pollution control equipment. Any feedlot expansion which constitutes enlargement and may increase emissions as defined in WAC 173-400-030(3) will require approval prior to construction.

4. RCW 70.94.154 **RACT requirements**, requires that all existing sources of air pollution use reasonably available control technology (RACT) to minimize emissions.

   WAC 173-400-040 **General standards for maximum emissions** states in part: "Further, all emissions units are required to use reasonably available control technology (RACT) which may be determined for some sources or source categories to be more stringent than the applicable emission limitations of any chapter of Title 173 WAC."