Attachment A

Options for Improving Open Lot Runoff Problems

The most common types of pollution abatement measures for open lot runoff are noted below, beginning with those that have the highest potential to positively impact water quality.

Lower Cost Improvements:

Move Fences/Change the Lot Area

- If water flows through the feedlot, adjust fencing so that the feedlot area does not enclose any part of a stream, intermittent stream, or waterway.
- Relocate all manure stockpiles away from any areas that create a discharge to "waters of the state".
- Move fences so that runoff from the open lot areas is directed away from waters and channels, and instead directed into areas where treatment can occur (e.g. onto cropland, grassed buffers, etc.). Reduce the open lot area to no more than what is needed to: i) maintain good animal health, ii) provide adequate feeding and watering space, and iii) prevent animals from becoming too agitated.
- Vegetate the abandoned portion of the lot that is no longer in use to utilize the accumulated nutrients.

Eliminate Open Tile Intakes and/or Feedlot Runoff to the Intake

Eliminate any open tile intakes where feedlot runoff may discharge to waters of the state and/or divert feedlot runoff away from the intake.

Install Clean Water Diversions and Rain Gutters

Where "clean" water enters the lot from the land upslope of the feedlot and flows through the lot, construct clean water diversions. Attach rain gutters to the open lot side of the buildings when and where needed.

Install Grass Buffers

Grade the soil and plant grass buffers downslope of the feedlot. Also construct spreaders where appropriate to prevent channelization within the grass buffers.

Maintain Buffer Areas

Remove any accumulated debris or undesirable organic matter from the vegetated filter strip and/or buffered areas and maintain the grasses to maximize treatment of pollutants in runoff. Terminate and reconstruct any areas where runoff is channelized upslope of the buffer or within the buffer. Use level gravel spreaders where appropriate.

Construct a Solids Settling Area(s)

Construct a solids settling area and picket dam to settle solids prior to reaching the grassed buffer. This may require some re-grading of the feedlot area. Concrete lips and slabs should also be considered where budget allows.

Prevent Manure Accumulations

- Scrape and haul at least once every seven days in areas where heavy defecation takes place such as around feeders, bunks, and watering devices.
- Relocate feeding areas away from potentially impacted areas and watering devices.
- Frequently move feeding devices to reduce any manure build up and accumulation.

Manage Feed Storage

- Relocate any feedstuff stockpiles or any decaying feedstocks that may produce leachate or contaminated runoff away from any receiving waters.
- Reduce feed spoilage and spillage from free-choice feeders by ensuring that they are properly adjusted.
- Do not overfill feed bunks, troughs, or other feeding devices where excessive feed waste may accumulate.
- Remove all non-palatable and spoiled feed from feeding devices and land-apply.

Manage Watering Devices

Adjust watering devices to prevent overflows and excessive leakage.

Higher Cost Improvements

Total Runoff Control and Storage

Total runoff control involves collecting all manure and feedlot runoff in liquid manure storage areas for storage and later use as a soil amendment to cropland/grassland. All liquid storage areas must meet Minn. R. 7020.2100. All new and existing storage structures must have sufficient capacity to manage their manure and feedlot runoff in accordance with land application requirements.

Roofs

Roofs constructed over the entire feedlot area can be used to eliminate contaminated runoff at the feedlot site. Clean water diversion berms are also needed at some locations to prevent runoff waters from entering the feedlot on the upslope side of a roofed area.

Runoff Containment with Irrigation onto Cropland/Grassland

This option involves constructing a runoff containment basin to hold runoff liquids until they can be pumped out of the basin and spray irrigated onto adjacent cropland or grassland. The irrigated liquids must be applied using rates, times, and methods which meet all land application requirements described in the General National Pollutant Discharge Elimination System (NPDES) / State Disposal System (SDS) Permit and which do not exceed the hydraulic loading capacity of the soil (i.e. no ponding or runoff).

Basin capacity: If the basin only collects feedlot runoff, and manure is not deposited or stored in the basin, then the basin must be sized to contain the 25 year, 24-hour storm event runoff *plus* storage capacity required to contain all runoff between land application events in accordance with the facility's Manure Management Plan *plus* at least one foot of freeboard. The basin must meet liner requirements established in Minn. R. ch. 7020.2100

Vegetated Infiltration Area

Vegetated infiltration areas are described in the Minnesota NRCS 635 practice standard as a Level 2 system. These systems have a settling basin followed by a large flat vegetated area that is completely surrounded by berms. The settling basin must hold at least a 10 year, 1 hour rainfall. The vegetated area generally must:

- Maintain live vegetation during the growing season;
- Have soil permeability of 0.2 to 6 inches per hour down to a five-foot depth;
- Be large enough to assimilate all nitrogen in runoff;
- Have more than ten feet of separation distance to fractured bedrock;
- Be relatively level with spreaders to ensure even distribution over the grass;
- Have a seasonal water table depth of five feet or more during the typical growing season; and
- Provide for even distribution of runoff at the top end of the vegetative treatment area using level gravel spreaders, gated pipe, small distribution tubes, concrete curb, weir, or the equivalent.

Tile-Drained Vegetated Infiltration Area with Secondary Vegetated Filter Strip

This design is essentially a standard infiltration area which has tile drainage below the infiltration area to drain saturated soils. The tile drains outlet onto a secondary vegetated treatment strip. More information about this type of design can be found at http://www.heartlandwq.iastate.edu/ManureManagement (click on "alternative technologies" heading and then go to "VTS Guidance Document" and see - chapter 7 VIB design).

Sunny Day Release onto Vegetated Infiltration Area or Filter Strip

The grassed treatment area for this type of design is similar to a standard vegetated infiltration area. However, instead of a settling basin, there is a runoff impoundment designed to hold runoff from November 1st to May 30th or the 25-year, 24-hour event, whichever is greater. Controls on the outlet of the impoundment allow release into the vegetated area during optimal times of growing vegetation and relatively dry soils.

Vegetated Filter Strips

The MPCA recommends that filter strips constructed as a permanent solution to runoff pollution be designed and maintained in accordance with the standards and principles set forth by Minnesota NRCS practice standard 635. For example, include settling basins or impoundments to settle manure solids prior to the vegetated treatment area and construct level spreaders to maintain sheet flow across filter strips.

The size of vegetated infiltration areas and filter strips should be designed in accordance with NRCS practice standard 635.

In some situations, filter strips may be expected to meet effluent limits and prevent pollution hazards immediately after construction, but may ultimately lead to pollution problems in the long term. This can occur when the filter strip does not function as designed, feedlot fencing or management is modified, or the runoff control is inadequately maintained, including failure to:

- Remove solids from the settling area;
- Clean feedlot outlet;
- Harvest vegetation;
- Prevent animal traffic on the treatment area;
- Maintain level spreaders; and
- Properly manage controlled releases.

Even though a filter strip on the edge of a stream may be able to show acceptable model results at the time of construction, it may be inspected at a later date and found to be a pollution hazard due to poor performance. The risk of becoming a pollution hazard in the future decreases when a margin of safety is built into the treatment system selection, siting, and design. Buffering lands between the end of the filter strip and waters can provide an added degree of treatment and margin of safety.