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Abstract

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RUNOFF CONTROL FROM DIRT LOTS

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A recent water quality survey assessment found nonpoint source pollution problems in a majority of Kansas surface waters - 85% of the monitoring sites were impaired by nutrients, 60% of the sites by bacteria, 55% by suspended solids and/or minerals, and 40% by oxygen-demanding substances. Swine producers have the responsibility to maintain the quality of ground or surface water near their production units. Outdoor dirt lots for confinement of swine are often overlooked as an area needing facilities for water pollution control.

Such facilities are dependent upon the size and make-up of a livestock operation, its surface draining characteristics, and the operation's waste management and disposal practices. The Kansas Department of Health and Environment (KDHE) administers the registration, permit, and certification requirements for confined livestock facilities in Kansas. The regulations became law in Kansas on July 1, 1967 and remain in place today. The laws are designed to minimize pollution leaving the vicinity of a confined feeding operation created by normal rainfall, intensive storms, or everyday manure production. The intent of the law is to be able to control, collect, and store the runoff. The collection and storage enable a producer to manage and properly disperse the liquids and nutrients from the production areas onto cropland or pasture.

Confined feeding is defined as confinement of animals in lot or pens, which are not normally used for raising crops and in which no vegetation, intended for animal food, is growing. Swine operations that are utilizing outdoor lots are subject to the regulatory requirements and are required by law to have a waste management plan and permit, if they meet any one of the following operational criteria.

1. The operation has a capacity of 300 or more head of cattle, hogs, or sheep or a combination of all three.

2. The operation, irrespective of size, utilizes wastewater control facilities such as manure pits, ponds, lagoons, or other devices.

3. The livestock operation is located near a stream or other aspects of the operation, such as improper disposal of dead animals, present potential water pollution problems.

4. Existing sale barns and collection centers provide capacity for more than 300 head and are utilized more than once a week.

5. The operation has livestock truck wash facilities, irrespective of size.

6. The operator(s) elects to come under the regulations.

It is important for swine producers to recognize that the 300 head is the total number of pigs on the farm, including those in gestation, farrowing, nursery, growing or finishing buildings, as well as the number that may be in outdoor lots. The total capacity is number of pigs plus other confined fed livestock and does not allow for adjustments based on animal weight, age, or type. The pig's weight or size

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will influence the size of holding pond or lagoon needed to handle the manure. Operations that have between 300 and 2,500 head capacity are required to follow the regulations established for Kansas and directed through KDHE's Division of Environment. Operations with a capacity of 2,500 head or more are required to meet the regulation establish by the Environmental Protection Agency (EPA). KDHE administers the EPA program, and when the larger operations meet EPA requirements, they are issued a NPDES permit.

Production units with a capacity of 2,500 head or more are required to contain all runoff from dirt lots in a lagoon or holding pond. A lagoon is sized to breakdown the solids and nutrients in the manure prior to dispersing the liquids onto cropland or pasture. Lagoons are normally used for handling manure from buildings. In a holding pond, there is little or no breakdown of the solids prior to dispersing. The primary function of a holding pond is to contain the runoff from a dirt lot before the nutrients are dispersed on farmland.

Normally, no registration of the operation is required if the total capacity is less than 300 pigs, unless an operation has pollution potential or a neighboring complaint is issued against it. Smaller operators are not allowed to have pens adjoining or draining into a road ditch, creek, or other channels without adequate control, because of the pollution potential. Much of the pollution potential is minimized by frequent cleaning of the pens and proper disposal of manure onto cropland or pasture.

The regulations for operations between 300 and 2,499 head allow for either discharging or nondischarging systems depending on the size of operation and location of lots in relationship to waterways and levels and potential for pollution. A discharging system separates the solids from the liquids by using settling basins, terraces, grass filter strips, or sedimentation structures. After separation, the water is then discharged into a grassed waterway, pasture, or cropped field. A nondischarging system may include a method for separating the liquids and the solids but the liquids portion of the runoff is contained in an earthened structure. The pond is later pumped, and the water is dispersed onto cropland or pasture. Operations that have more than 2 acres of dirt lots or 750 pigs will probably be required to have a nondischarging type of waste control facility. A discharging system could be utilized for those with less than 2 acres of dirt lots or between 300 to 750 head capacity.

Figure 1 shows some of the options that are available for controlling the runoff from dirt lots. In each case,there are certain restrictions that will apply and design specifications that have to be met. Some of the criteria are:

1. Dirt lots and runoff control facilities cannot be within 100 feet of the property line.

2. Water pollution control facilities must be able to handle the runoff generated by 25 yr/ 24 hr storm, which is equal to about 5 in. in western Kansas, 6 in. in central Kansas,and 7 in. in eastern Kansas.

3. Lowest elevation of the feeding area or waste control facilities must a minimum of 10 ft above groundwater aquifers or seasonal perched tables.

4. The lots must be located a minimum of 100 ft from wells or reservoirs and 50 ft from rural water district lines.

5. Sedimentation structures are needed, with the type being dependent upon the drainage area.

6. If a holding pond or lagoon is used, then provisions must be made for pumping the water including both certain land requirements and pumping equipment.

Figures 1a, 1b, and 1c are examples of discharging systems. The runoff from the pens is uniformly dispersed onto cropland or pasture in Figure 1a. This type of system is normally used with operations less than 300 head or 1 acre in size. As the capacity increases, then

the options shown in Figures 1b and 1c may be able to be used. In both of these designs, the sedimentation channel may be a terrace or channel and is sized to hold the runoff for 1 hr prior to discharging onto the land. The 1 hr retention time results in large sedimentation structures as the acreage of the lots increase. Figures 1d and 1e are examples of nondischarging systems. A nondischarging serpentine terrace system is shown in Figure 1d. The total capacity of the terrace channels has to be able to contain the 25 yr/24 hr storm runoff from the dirt lots and any additional drainage area. Figure 1e show a sedimentation channel with the runoff draining into a lagoon or holding pond. The sedimentation structure is optional for small lots but required if the drainage area is more than 15 acres. If waste water from a building is also draining into the pond, then a sedimentation structure should be considered.

These are only a few of the regulations. A complete copy can be obtained from the KDHE district or state offices. A holding pond or lagoon should be constructed with side slopes of 3 to 1, minimum berm width of 10 ft, and a minimum of 12 in of clay around the sides and in the bottom. The earthen structures cannot have a seepage rate greater than 1/4 in per 24 hr. Generally, the minimum storage period is 120 d with a minimum volume to handle 120 d of normal rainfall, 25 yr/24 hr storm, and manure production. The storage structures also must have a minimum freeboard depth of 2 ft. Additional details also are provided for pump ing regulations, fencing, maintenance, and inspection.

Swine operators should not locate dirt lots near streams or running water or in areas like a ravine where cropland or pasture may drain through the pens. Any water draining from adjacent fields through a lot must be controlled using either a discharging or nondischarging pollution control system. Therefore, it is important to divert runoff from cropland or pasture around the dirt lots using terraces or channels. In some cases, it may be easier to relocate the pens rather than control the excess runoff. For new operations, dirt lots should be located on higher land rather than bottom land to minimize the drainage and potential pollution problems.

The livestock industry is giving greater attention to reducing its effect on the environment. As the demand grows for cleaner streamflows, smaller dirt feedlots will need to reduce and control the nutrient and sediment loading of the runoff leaving the feedlot vicinity.

Runoff potential of existing dirt lots will need to be evaluated. Costs of controlling the runoff must be weighed against new lot construction in an alternate location or new building construction. Future dirt lots will need to address current regulations and be designed for compliance with future and more stringent regulations.

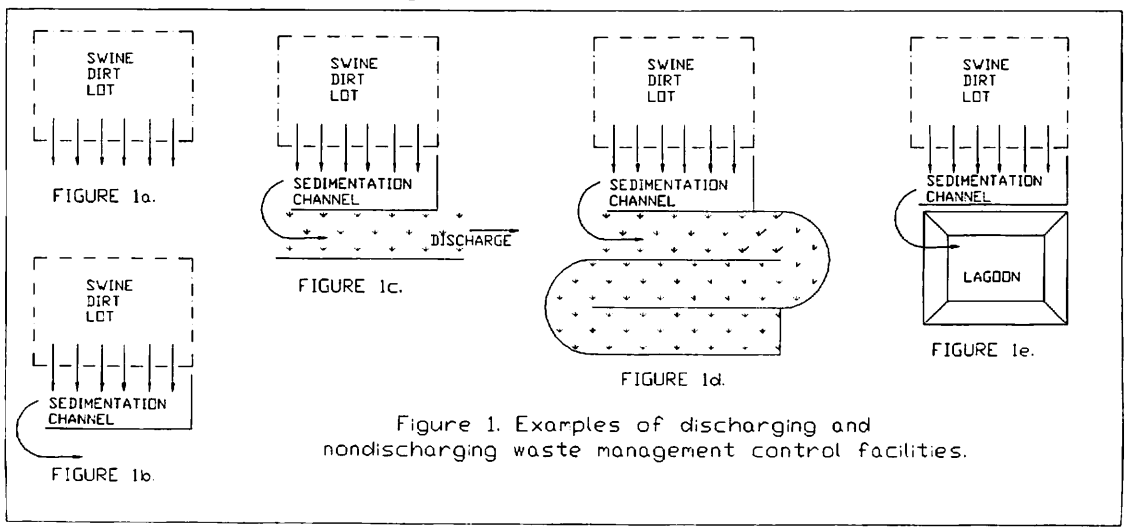

Figure 1. Examples of discharging and nondischarging waste management control facilities.