

COMMENTS SUBMITTED  
ON BEHALF OF THE

Botz Family Farm, L.L.C.  
7187 70<sup>th</sup> Street NE  
Cando, ND 58324

The following recommendations are made in order to clarify some concerns we have with the current proposed regulations that the North Dakota Division of Water Quality has proposed in response to the new federal CAFO NPDES regulations released February 12, 2003.

language - single underline language our comments

language - Double underlined language our changes

~~language~~ - Double strike through are deletions

CHAPTER 33-16-03.1  
CONTROL OF POLLUTION FROM ANIMAL FEEDING OPERATIONS

**33-16-03.1 - 03 DEFINITIONS:**

**There are a number of additional definitions and revisions that we feel the Division needs to incorporate into their proposal in order to make the regulations more comprehensive.**

**(1) “ABANDONED FACILITY” An animal feeding operation that has not confined or stabled animals during a consecutive 12-month period. See section 81.13 - Abandoned Facility for additional requirements. Also pertains to specific sections of a facility that have not confined any animals for forty-five days or more during a period of 90 consecutive days annually.**

**3) “Best management practices”** means schedules of activities, prohibitions of practices, conservation practices, maintenance procedures, and other management strategies to prevent or reduce the pollution of waters of the state or the degradation of water quality standards. Best management practices also include treatment requirements, operating procedures, and practices to control production area and land application area runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

4) **“Concentrated animal feeding operation”** means an animal feeding operation that is defined as a large concentrated animal feeding operation (Definition ~~40~~ 11 ) or as a medium concentrated animal feeding operation (Definition 18), or is a small or other type of animal feeding operation designated as a concentrated animal feeding operation in accordance with section 33-16-03.1-04 (Designation of concentrated animal feeding operations). For purposes of determining animal numbers, two or more feeding operations under common ownership are considered to be a single animal feeding operation if they adjoin each other or if they use a common area or system for the disposal of wastes. All concentrated animal feeding operations are required to obtain a North Dakota pollutant discharge elimination system permit pursuant to chapter 33-16-01.

(--) “CATASTROPHIC EVENT” is equivalent to a 25-Year, 24-Hour, 10-Year, 24-Hour or 100-Year, 24-Hour Storm event. Catastrophic Events could also include tornadoes, hurricanes, or other catastrophic conditions that would cause an overflow from the required manure and runoff control structure.

(--) “CHRONIC RAINFALL” is a series of wet weather conditions that preclude dewatering of properly maintained manure and runoff control structures.

5) **“Discharge of a pollutant”** ~~and “discharge of pollutants” each means any addition of any pollutant to the waters of the state from any source, including the disposal of pollutants into wells.~~ (Means the introduction or addition of a pollutant into state waters by the release or leaking, pumping, pouring, emitting, emptying, dumping, escaping, seeping, leaching or other means of release of waste, waste waters or pollutants into any waters of the state or into or on any location where they may in all probability then enter waters of the state.

(--) “HYDROLOGICALLY SENSITIVE AREA” includes: Areas where significant groundwater recharge occurs or where contamination from animal feeding operations could impact existing drinking or potential water sources or withdrawals, classified uses, water quality standards or reasonably likely future public drinking water system withdrawals; areas where animal feeding operations could impair water bodies subject to antidegradation review.

7) ~~“Earthen storage pond or pond” means an earthen pond used to store manure, process wastewater and runoff from the production area of a livestock facility.~~

**“IMPOUNDMENT”** means a natural topographic depression either below or above ground level, man-made excavation, or diked area

formed primarily of earthen materials (although it may be lined with man-made materials or other seepage control materials), or any other structure which is used for the storage, treatment, recycle, evaporation and/or dispose of wastewater and/or stormwater or discharge of pollutant-containing waters, sludge or associated sediment.  
Impoundments can be aerobic, anaerobic, or facultative, depending on the impoundments loading and design parameters.

(--)"LAND APPLICATION SITE" - means land under the control of a CAFO owner or operator, whether it is owned, rented, or leased, to which manure or process wastewater from the production area is or may be applied. A land application site also means land not owned, rented, or leased by a CAFO owner or operator and where the CAFO owner or operator controls the quantity of manure or process wastewater that is applied, This includes, but is not limited to lands retained by an easement.

(--)"LEAKAGE" Means loss of liquids from a surface impoundment into the subsurface in excess of the expected seepage rate of the liner material, generally from an area of the liner that is damaged or constructed improperly resulting in a higher permeability than other portions of the liner system.

(--)"NEW SOURCE" A New Source is defined under 40 CFR 122.2 as a facility that commences construction after April 14, 2003 and:

(a) It is constructed at a site at which no other source is located; or

(b) It totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or

(c) Its processes are substantially independent of a preexisting source at the same site.

(--) "SALINITY" Means the concentration of total dissolved solids (TDS) as determined by laboratory analysis and reported in ppm or mg/l, including but not limited to potassium, calcium, magnesium, carbonates, sulfates, and chlorides.

(--) "SATURATED SOIL" Means soil which has absorbed water or other liquid to the extent that any additional water or liquid may cause ponding at the surface for a period of twelve (12) hours or more.

(--) "SEEPAGE" Means the volume of flow through an impoundment bottom and/or sides as calculated using Darcy's Law which states that the seepage rate is directly proportional to the permeability of the liner material and the hydraulic gradient of the liquid contained in the impoundment.

(--) "SETBACK " means a specified distance from waters of the state, or potential conduits to waters of the state.

#### **33-16-03.1-04. Designation of concentrated animal feeding operations.**

a. The size of the animal feeding operation and the amount of waste~~s~~ reaching or having the potential to reach waters of the state;

#### **33-16-03.1-08. Facility requirements.**

6) Manure storage structures. All livestock facilities requiring permits under this chapter and all concentrated animal feeding operations requiring permits under chapter 33-16-01 and which are constructed or expanded after April 14, 2003 ~~2004~~, must meet the following requirements

The Federal Regulation specifically states that the effective date of the regulations is April 14, 2003 and all determinations of "New Sources" or expanded facilities are based from that date. NOT April 14, 2004. This is in direct violation of the federal requirements.

6)(b) The Division has not clearly defined what the groundwater site assessment criteria are for manure storage structures.

6)(c) The Division has not and "Must" define or establish a minimum seepage rate allowed for all manure impoundments or structures. Seepage as defined by Darcy's Law is the product of permeability multiplied times the hydraulic gradient. The hydraulic gradient is the ratio of the maximum height of liquid plus liner thickness to the liner thickness itself. The Clean Water Act lists a maximum allowable permeability of  $1 \times 10^{-7}$  cm/sec. The value for seepage rate and permeability is used by Darcy's Law to solve for the value of hydraulic gradient. In this case, the value for the maximum hydraulic gradient allowed is ten (10) using Colorado's seepage rate restrictions.

A seepage rate of 1/32 inch per day is equivalent to 848 gal/acre/day. A structure that has a surface area of 6 acres would have the potential to seep 1.8 million gallons per year or 3.6 million gallons under the proposed 1/16" per day for lined earthen storage ponds.

It is not enough to establish a maximum seepage rate without additional calculations to determine what volume that equates to and to determine the loading of pollutants in that volume of seepage.

If the concentration of total dissolved solids in that 1.8 million gallons was equal to 1000 ppm, then the amount of salts allowed to enter the subsurface and subsequently the groundwater would be 15,429 lbs of salt per year.

The agency is obligated to perform groundwater modeling to make sure that water quality would not be impaired due to this allowable seepage. There are many hydrogeological situations that would not be able to assimilate that type of loading and still show no adverse impact to waters of the state.<sup>1</sup>

In our opinion the Division has never attempted to calculate the loading impacts posed by CAFO impoundments and has completely ignored the mass loading and leaching impacts of contaminants into groundwater from these impoundments.

6)(d) WE DISPUTE THE IMPLICATION BY THE DIVISION THAT THERE MIGHT BE CIRCUMSTANCES WHERE A LINER IS NOT NECESSARY.

For the Division to virtually allow a "No Seepage Rate Standard" by proposing "a liner is not necessary" is TOTALLY UNACCEPTABLE because it virtually allows unlimited seepage and is based on no substantiated facts or evidence.

Although there might exist an "impermeable geological layer" beneath the "production area", the Division fails to address potential faults, fractures or channels that may exist along the perimeter of such an area.

Also, the Division has failed to provided adequate modeling requirements or evidence that the allowance of a "No Seepage Rate Standard" will not transcend in a horizontal direction, detrimentally impacting adjacent lands, groundwater or surface water nor does the Division have any clue as to the rate that the contaminates and wastewater will transcend in a horizontal or vertical direction under a "No Seepage Rate Standard".

The Division must set a maximum allowable seepage rate for all impoundments. "No Seepage Rate Standard" does not protect the state or its citizens and the environment and potentially puts the public at risk.

The Department must not abdicate its primary responsibility to protect the state and public through the promulgation of and enforcement of appropriate standards.

(7)(b) The Division once again is using an effective date that is in direct conflict with the Federal requirements.

#### **33-16-03.1-09. Record keeping and reporting requirements.**

1. The operator of a livestock facility requiring a permit under this chapter or a concentrated animal feeding operation requiring a permit under chapter 33-16-01 shall record and maintain the following for a period of not less than ~~three~~ five years:

The Federal Requirement is that records are maintained for a least five years.

#### **33-16-03.1-10. Enforcement and compliance.**

4) If the department finds that a facility, which has not been covered by a state animal feeding operation permit or a North Dakota pollution discharge elimination system permit within the last five years, is causing or is likely to cause pollution of waters of the state, or poses a significant threat to public health or safety, the operator will be notified that actions shall be taken to prevent the pollution.

5) Within one hundred and twenty days following the notification described in

subsection 4, the operator shall submit a compliance plan to prevent the facility from impacting waters of the state.

a. The compliance plan shall be prepared in accordance with the minimum requirements of this chapter and the “*North Dakota Livestock Program Design Manual*”. The plan shall contain adequate information to enable the department to determine whether the proposed measures will abate or prevent pollution of waters of the state. The operator also shall present a proposed schedule for plan implementation and completion.

b. If the compliance plan allows for operation of the facility in a manner that will not cause nor likely cause pollution of waters of the state, the department will issue a permit with a compliance schedule for construction. Approval of the permit shall be contingent upon any changes which may be required by the department after its review of the proposed plan. The construction must be completed within the time frame specified in the compliance schedule.

c. If the approved compliance plan needs to be modified or amended during construction, the operator shall notify the department prior to making any modifications or amendments and they must be approved by the department.

**The Federal Regulation states that every CAFO will obtain an NPDES permit, unless they can demonstrate that they pose "No-Potential to Discharge". The Federal requirements goes on to state that any facility that has had a discharge in the last five years prior to applying for a permit, CAN NOT obtain a "No-Potential to Discharge" classification from the Division and MUST obtain a permit under the appropriate time frame outlined under the Federal Requirements.**

#### **33-16-03.1-11. Departmental inspection.**

**The Division needs to include language that clearly defines the documents that must be maintained on site and that a full copy of their permit is readily available on site for inspection as well.**

#### **33-16-03.1-12. Prohibited activities.**

**3)** To dispose of an animal carcass along or in any stream, lake, river, or other surface water or to bury the carcass near any such surface water **or within 150 feet of subsurface waters**, or dispose of a carcass in a manner that is in violation of a North Dakota Administrative Code Article 33-20, or with North Dakota Century Code Chapter 36-14.

**6)** To discharge manure or process wastewater from a livestock facility except:

a. The overflow of a properly operated manure storage structure due to a chronic or catastrophic rainfall greater than a 25-year, 24-hour event or greater than a 100-year, 24-hour event for swine, chicken, turkey, or veal calf facilities; or

b. Seepage from the manure storage structures that is within the standards as specified in the *North Dakota Livestock Program Design Manual*

**These two exemptions are only true and accurate if in fact the facility processes a current NPDES permit with the state.**

### **33-16-03.1-13. Public participation**

1. If the department determines a significant degree of public interest exists, the department will issue a public notice requesting comment on applications for both individual permits and general state animal feeding operation permits.

**The Department/Division should require all applications be issued for public comment and allow the citizens of the State their "DUE PROCESS" under the United States Constitution and the North Dakota Constitution.**

**It is the duty and obligation of the Department/Division to look out for the health, welfare and wellbeing of all citizens and allow them equal opportunity within the process to raise and address issues regarding development in their area, which pose a direct and indirect impact on the quality and way of life, their personal property rights and jeopardizes their health, welfare and wellbeing.**

**CAFOs generate odor, air and water pollution, all of which have a direct impact on neighboring properties. The closer the neighboring property, the more severe the impact is likely to be. The resulting loss of exclusive use on neighboring properties lowers their values and ultimately also lowers the taxes generated from these properties.<sup>1</sup>**

**6)** The department will hold a public meeting or hearing ~~as it deems appropriate~~ to allow additional public input, or to provide information to the public concerning the departments' review of the facility. Established residences within five miles must be notified by certified, registered mail.

**Does not the North Dakota Administrative Procedure Rules and/or Century Code require that an agency MUST hold a public hearing prior to the issuance of a permit to an applicant?**



<sup>1</sup> "Foundations of Sand, Considering the Rationale for Factory Farming"; Dr. William J. Weida, January 26, 2004

## **Factual Issues:**

### **Need for a more Adequate Nutrient(s) Management Plan, Soil and water sampling**

- a) Animal waste is the largest contributor to pollution in 60 percent of the rivers and streams classified as "impaired" by the EPA. According to the same report, the United States generates 1.4 billion tons of animal manure every year - 130 times more than the annual production of human waste. Cattle manure leads the list at 1.2 billion tons, followed by pig manure at 116 million tons, and chickens manure at 14 million tons.<sup>1</sup>
- b) In, 1996, hog waste was inadvertently siphoned from a lagoon directly into the plants water wells, and thus into the local groundwater. It was six weeks before the company reported the incident to state water authorities.<sup>2</sup>
- c) The USDA study states that every year U.S. animal feeding operations generate more than 350 million tons of manure that must be disposed of every year. Manure can provide valuable nutrients (nitrogen and phosphorus) when applied at the proper rates to cropland as fertilizer. However, those same nutrients can "degrade water quality if they are over applied to land and enter water resources through runoff or **leaching**."<sup>3</sup>
- d) Meeting nutrient application standards will require CAFOs to spread their manure over a much larger land base than they are currently using, and most will need to move their manure off the farm. For example, only 18 percent of large hog farms and 23 percent of large dairies are currently applying manure on enough cropland to meet a nitrogen nutrient plan. Even if large hog farms spread manure over their entire land base, only 20-50 percent operate enough land to meet land application standards, depending on whether a nitrogen- or phosphorus based plan is to be met. Similar results would be expected for beef and poultry.<sup>4</sup>
- e) Competition for land on which to spread manure could be severe in regions with high concentrations of animals. Animal feeding operations in 2 to 5 percent of U.S. counties produce more manure nutrients than can be absorbed by total cropland and pasture in each county.<sup>5</sup>
- f) There is growing evidence that nitrate contamination of groundwater is increasing in Kansas and in most areas of the High Plains Aquifer (USGS, 2001).<sup>6</sup>
- g) Kansas Geological Survey analyzed 112 samples to determine the source of nitrogen in well water and found 42% was derived from animal waste. USGS has found levels of nitrates exceeding the health standards at water table depths greater than 100 feet. In wells of their own construction near Garden City, Kansas, they found 54 ppm of nitrate-N at 121 feet traced to animal waste (by nitrogen 15 isotope analysis) and 22 ppm at 161 feet (USGS, 2000).<sup>7</sup>
- h) "We soil sampled forty-one fields with long-term manure application histories to assess the current status of manured cropland in terms of its potential for nitrate leaching, phosphorus pollution of surface waters, and soil salinity buildup. The data shows 300-400 lb of excess

nitrate per acre of cropland, very high soil phosphorus levels, and no excessive salt buildup (>4 dS/m). Our data showed that this was not true; there is very high potential for nitrogen and phosphorus pollution of Colorado water from manured cropland and the salinity buildup has not been crop limiting." <sup>8 - 1997</sup>

Nitrate contamination of groundwater caused by over application of manure to land is a critical problem in the South Platte River Basin of northeastern Colorado. The problem is exacerbated due to the concentration of feedlots and manure in localized areas. <sup>8 - 1999</sup>

There was no relationship between the amount of N applied to a field as manure and the amount of N applied as fertilizer. In other words, fields that are manured are still fertilized with the same amount of N fertilizer as non-manured fields. Seventy-two percent of producers stated that they soil test prior to making fertilizer application rate decisions. However, the use of soil testing had no impact on total application of nitrogen as fertilizer or manure. <sup>8-1999</sup>

Manure is often applied at excessive rates due to farmers' lack of confidence in reported nitrogen (N) mineralization rates (a measure of the availability of the N for crops). Research-based mineralization rates have often come from more humid parts of the country or are based on laboratory incubations under ideal conditions. Excessive manure application rates are used by farmers to ensure adequate nitrogen for crop growth, but have been shown to cause nitrate leaching below the root zone and into groundwater supplies in some cases. <sup>8-2000</sup>

Livestock production tends to be concentrated in specific areas in Colorado, leading to over-application of manure near these production areas, and subsequently diminished water quality. High transportation costs combined with low perceived manure value limit the utilization of manure to agricultural fields near livestock production facilities. <sup>8-2002</sup>

**Need for the Restriction of allowable Seepage rates**  
**and**  
**Exceedance of Performance Standards is a Discharge and direct violation of the Regulations.**

- a) Nitrate levels higher than three ppm are in excess of background or naturally occurring levels and, therefore, have been influenced by human activities. <sup>9</sup>

Areas most at risk for groundwater contamination generally have sandy, highly permeable soils with little organic matter, have sufficient rainfall or irrigation to promote deep leaching and are located over shallow, unconfined aquifers. For this reason, broad generalization of causes of nitrates in groundwater are not only scientifically unacceptable, they also may misinform the public and decision makers. <sup>10</sup>

- b) The allowance of 1/32"/day (1 x 10<sup>-6</sup> cm/sec.) seepage rate is equivalent to approximately 850 gallons/day per each acre of lagoon area or 1.5 million gallons per year for every 5 acres of lagoon area, which poses a significant potential impact to ground water.

*We 100% do NOT agree with the other Proponents assessment that as long as the seepage rate does NOT exceed 1/32"/day (1 x 10-6 cm/sec.) that the seepage by its virtue is of an insignificant nature. The Divisions argument that the above seepage rate has been used in the design of numerous domestic facilities I do not believe provides the proper relationship of domestic facilities and the volume of waste in an AFO's waste lagoon.*

- c) Swine, for example, creates approximately 2 to 4 times the waste that humans produce. A typical swine livestock facility of 10,000 hogs will create the same amount of waste as 20,000 to 40,000 humans.<sup>11</sup> A single 2,000 head dairy CAFO will produce the same waste volume and strength as 46,000 humans.<sup>12</sup>

Per the "Source Water Assessment Methodology" report that the Division is proposing to use for assessment purposes, it indicates that there are approximately 63,000 Domestic systems (septic systems) in the state. If you use a conservative value of 2,000 gallon capacity per system, you have 126,000,000 gallons. Compare that to one hog operation in eastern Colorado with 25 facilities that have an approximate total lagoon capacity of 94,037,575 gallons, which is equivalent to 75% of the total domestic facilities in the State. The waste volume from CAFO's is NOT an insignificant amount of waste nor is the allowable seepage rate at 1/32" per day an insignificant amount. This is especially true when you consider the cumulative volume of waste that is allowed to seep into the intervening layer of subsurface materials and ultimately into our groundwater sources from all of the facilities especially in a region like northeastern Colorado, where it has been inundated with Confined Animal Feeding Operations within close proximity to each other.

- d) A Kansas State University study showed that the average seepage of 9 lagoons studied was 1/20" of an inch per day, but also showed that the subsurface ammonium-N losses from the bottom and sides of the lagoons could exceed 2,640 lbs/acre-yr and over a twenty year period could exceed 250,000 lbs.

About 90% of the nitrogen found beneath the lagoon was within 12 feet of the lagoon bottom. This was attributed to the clay mineral in the soil and a large cation exchange capacity, which can retard movement. However, ammonium-N is NOT stable and could convert to nitrate, and move to deeper depths and contaminate groundwater.<sup>13</sup>

- e) A Kansas State University study showed that an area of sandy soil beneath a lagoon showed 66 ppm of Ammonium-Nitrates at depths of 16 feet. This shows how a lower cation exchange capacity allows nitrogen to move to lower depths. Ammonium could potentially move directly into groundwater at sites built above shallow aquifers in Sandy Soils.<sup>14</sup>
- f) Numerous studies have highlighted the actual leakage rates for animal waste lagoons. A Minnesota Pollution Control Agency study found some lagoons leaking 500 gallons per acre per day.<sup>15</sup> A study commissioned by the Iowa Legislature in 1997, discovered that over 70% of earthen lagoons examined were leaking faster than Iowa standards allow some more than twice as fast. This report, released in January of 1999, warns that surface waters are at risk

to potential contamination and that pollution of groundwater is now unavoidable. The report also discovered poor maintenance and management practices at 76% of the facilities studied, which researchers consider a threat to water quality.<sup>16</sup>

- g) In a study from Kansas State University, one swine lagoon being studied was leaking 4.35 million gallons per year and calculated to leak 87.1 million gallons over the life of the facility.<sup>17</sup> According to the University of Nebraska, the bottom of earthen lagoons leak less than 750 gallons per acre per day, but sidewall leakage can be 8 times higher than this.<sup>18</sup>
- h) Dr. Stephen D. Arnold, from New Mexico State University provides data on the impacts of dairies in a recent preliminary study measuring daily feedlot contributions to groundwater contamination. This study found elevated levels of nitrate, ammonia chloride, nitrogen, and total dissolved solids. Samples were obtained from groundwater monitoring wells located around dairy wastewater lagoons that were lined with clay, concrete, or synthetic membranes. Mean nitrate concentrations were significantly higher in groundwater samples taken in the vicinity of lagoons with clay liners. The lagoons containing the synthetic membranes produced the lowest mean groundwater concentrations of ammonia and nitrate. Nitrate was the only groundwater contaminant measured that showed a consistently increasing trend from 1992-1997. However, according to the researchers, the most important thing to note is that the mean concentrations for all contaminants tended to increase as the size of the dairy herds increased.<sup>19</sup>
- i) Freezing and thawing, as well as wetting and drying, may cause the sidewalls of earthen pits/lagoons to crack, allowing wastes to seep into the subsurface soil. Earthworm channels can allow water to move through the sidewall/liner. Groundwater contamination will result if the subsurface soil does not have sufficient ability to filter the contaminants contained in the leachate.<sup>20</sup>

#### **ABANDONED FACILITIES** **TEMPORARILY CLOSING OR PERMANENTLY CEASING OPERATIONS**

- a) When confined livestock or poultry production facilities cease operations, the earthen manure storage and treatment structures must be closed properly to ensure that surface water and groundwater are protected. These structures include lagoons, settling basins and waste storage ponds.

Recommendations from "Closure of Earthen Manure Structures", published by the National Center for Manure and Animal Waste Management, which is supported by the U.S. Department of Agriculture (USDA) Fund for Rural America Program.

At a minimum, all CAFO owners who are temporarily closing or permanently ceasing operations must:

- Remove all waste and wastewater from the structures within **6 months** of discontinuing use.
- **All costs associated with TEMPORARILY CLOSING OR PERMANENTLY CEASING OPERATIONS shall be paid by the operator(s).**

Refer to Section 8.8 of Livestock Program Design Manual:

**Abandoned Facility**

- (1) **A facility that has been abandoned must dispose or utilize the manure and process wastewater generated in a beneficial manner within 6 months of a facility meeting the designation of an abandoned facility.**
- (2) **Refer to Section 3.2.3 of the Livestock Program Design Manual: All facilities will provide proper and adequate bonding for their facilities during the construction phase and maintain it to cover any post closure cost incurred for the removal of waste and proper closure of impoundments and open lot surfaces.**

- Submit within 90 days of discontinuation a notarized certification that the structure has been closed according to this provision; place a map depicting the location of the closed structure in the Pollution Prevention Plan.<sup>21</sup>

b) An abandoned animal feeding facility is a significant threat to the environment. Procedures to minimize the risk are discussed. **No matter how long the period of non-use is expected to be, manure should be removed to minimize transport of manure from the site via runoff and the risk of groundwater pollution.**

Feedlot abandonment occurs for various reasons, including economic and social changes, environmental concerns, consolidation for more cost effective management and operation, and modification of personal goals. Whether a feedlot is abandoned for a short time until some crisis passes, or permanently, steps are necessary to minimize the risk of environmental degradation.

Under both scenarios, an abandoned feedlot poses an immediate threat to surface and groundwater quality. The unused facility is also a potential nuisance and source of health problems for humans and animals.

One study found an average of 6,400 lb./acre nitrate-nitrogen in the 30 ft. of soil profile beneath four feedlots that had been abandoned at least three years in Nebraska. This compares to 500 lb. nitrate-nitrogen found in the same profile below cropland. Removal of the manure pack is the only feasible method to prevent these types of massive nitrate leaching events.<sup>22</sup>

- c) As a part of their normal operation CAFOs may, among other things, have manure and litter storage structures, lagoons, and feed storage areas. The abandonment of any one of these has the potential for catastrophic environmental damage to waters of the U.S.<sup>23</sup>
- d) Abandoned feedlots have a large potential to cause NO<sub>3</sub> leaching as the surface seal cracks and deteriorates. For this reason, pens need to be thoroughly cleaned and scraped down to bare earth prior to abandonment. Revegetation of the old pens is also important to help absorb excess soil nutrients and prevent erosion.<sup>24</sup>

- e) Abandoned feedlots and waste storage structures, especially earthen waste storage structures, can pose significant water quality problems. Any abandoned feedlot or waste storage structure should be cleaned or completely emptied. Remove the top foot of soil in feedlots and the top two feet of liner materials from earthen waste storage facilities and spread it over croplands, just like manure. The remaining hole should also be filled and seeded with vegetative cover. If manure is stacked in fields, it should be removed as soon as conditions permit.<sup>25</sup>

### **PATHOGENS AND ANIMAL WASTE**

- a) In addition to nutrients such as nitrogen and phosphorus, liquid manure can also contain viral and bacterial pathogens, weed seeds, parasites, heavy metals, antibiotics, disinfectants, and insecticides. CAFO's have been indicated in the emerging problems of listeria, cryptosporidium and toxic Ecoli, and dangerous antibiotic resistant bacteria. The costs of CAFO's are shifted onto the public in the form of wasted and polluted natural resources and health and environmental cleanup.<sup>28</sup>
- b) Animal manure can contain as many as 25 organisms that cause diseases such as salmonella, anthrax, leptospirosis, listeriosis, tetanus, foot and mouth disease, ringworm, toxoplasmosis, and others.<sup>29</sup> Numerous chemical and microbial constituents have been found to be present in both ground and surface water proximal to large-scale swine operations. Some of the contaminants discovered were chemicals (pesticides, antibiotics, heavy metals, minerals, and nutrients) and microbial (Escherichia coli, Salmonella, Enterococcus, Campylobacter, and Cryptosporidium parvum and Yersinia.<sup>30</sup> Because of their tightly confined surroundings, animals in factory farms exhibit signs of stress. A recent study found that stressed animals exhibit higher pathogen loading in their waste than animals that are not under stress.<sup>31</sup>
- c) Salmonella, another pathogen that can occur in dairy waste, has been shown to be more prevalent as dairy herd size increases. One strain of this pathogen, DT104, is of particular concern because it displays multiple drug resistance. This strain was discovered on 64% of cattle isolates in Washington State in 1999. Salmonella has the ability to survive on agricultural dust and in moist conditions such as roadside ditches and areas of ponding on agricultural lands. A study also suggests that nearly all dairy operations will be positive for Ecoli O157:7 if sampled often enough.<sup>32</sup>

### **MORTALITY, ANIMAL WASTE AND CARCASS DISPOSAL**

Improper disposal of dead animals can be a health threat to other animals and man, as well as a threat to both surface and groundwater quality. ~~Optimally,~~ **Operator shall** be responsible for dead animals to be brought to or picked up by a rendering company.<sup>33</sup> **Refer to Livestock Program Design Manual Section 6.4. Dead Animal Disposal.**

- b) Burial in a hole or specially designed pit is a less recommended method of dead animal disposal. Burial presents a risk to both surface and groundwater. **A time line and payment responsibility needs to be established.**<sup>34</sup>

- c) Burying dead stock, however, may result in some nitrate being available to leach to groundwater. The larger the volume buried, the greater the risk. **This type of concentration of animal waste could also be considered a point source.**<sup>35</sup>

## **Footnote References:**

- <sup>1</sup>Silverstein, Ken, "Meat Factories", Sierra Magazine, January/February 1999
- <sup>2</sup>Silverstein, Ken, "Meat Factories", Sierra Magazine, January/February 1999
- <sup>3</sup>USDA - ERS Research Briefs; "Manure Management for Water Quality: Cost to Animal Feeding Operations of Applying Manure Nutrients to Land"; AER-824; pg. 1
- <sup>4</sup>USDA - ERS Research Briefs; "Manure Management for Water Quality: Cost to Animal Feeding Operations of Applying Manure Nutrients to Land"; AER-824; pg. 2
- <sup>5</sup>USDA - ERS Research Briefs; "Manure Management for Water Quality: Cost to Animal Feeding Operations of Applying Manure Nutrients to Land"; AER-824; pg. 2
- <sup>6</sup>Volland, C.; Zupancic, J.; Chappelle, J.; "Cost of Remediation of Nitrogen-Contaminated Soils Under CAFO Impoundments"; 2002 Proceedings - Waste Research Technology
- <sup>7</sup>Volland, C.; Zupancic, J.; Chappelle, J.; "Cost of Remediation of Nitrogen-Contaminated Soils Under CAFO Impoundments"; 2002 Proceedings - Waste Research Technology
- <sup>8</sup>Davis, JG; "High-Value Utilization of Manure to Improve Soil Quality and Protect Water Quality", Project\* COL00685, <http://www.colostate.edu/Depts/AES/projs/685.html>
- <sup>9</sup>Sagars, William I., "Nitrates in Groundwater: Some facts on occurrence", Poultry Digest, August 1995
- <sup>10</sup>Sagars, William I., "Nitrates in Groundwater: Some facts on occurrence", Poultry Digest, August 1995
- <sup>11</sup>Sierra Club, Concentrated Animal Feeding Operations - Hogs, <http://www.sierraclub.org/chapters/ok/cafo/hog> p.2
- <sup>12</sup>United States Environmental Protection Agency, "Population Equivalent" for Waste Pollution Potential by Waste Volume and Strength.
- <sup>13</sup>Ham, J. M.; Reddi, L. N.; Rice, C. W.; "Animal Waste Lagoon Water Quality Study", A Research Report by Kansas State University, June 23, 1999.
- <sup>14</sup>Ham, Jay. M.; Ph. D; "Seepage Losses from Animal Waste Lagoons: Potential Impacts on Groundwater Quality", February 11, 1999.
- <sup>15</sup>Missouri Rural Crisis Center, "Hog Wars - The Corporate Grab for Control of the Hog Industry and How Citizens are Fighting Back" (co. 1996) p.14.
- <sup>16</sup>Glover, Mike, "Earthen Lagoons a Danger", DesMoines Register, January 29, 1999
- <sup>17</sup>Volland, Craig, "Critique of Kansas State Lagoon Research Project", September 13, 1998  
[www.ukans.edu/~hazards/lagoon/lagcrit.html](http://www.ukans.edu/~hazards/lagoon/lagcrit.html)
- <sup>18</sup>Kansas Rural Papers, May 1998, p.3
- <sup>19</sup>Arnold, Stephen D., Meister, Edward A., "Dairy Feedlot Contributions to Groundwater Contamination", Environmental Health, September 1999, pg. 16-19
- <sup>20</sup>"Assessing and Reducing the Risk of Groundwater Contamination from Livestock Waste Storage", KY A'SYST, ip-45; Kentucky Cooperative Extension Service and US EPA.



- <sup>21</sup>Mukhtar, Saqib, Walker, Jerry D., "Closure of Lagoons and Earthen Manure Storage Structures", Texas Cooperative Extension, Texas A&M University, B-6122
- <sup>22</sup>Bodman, Gerald R., Koelsch, Richard, "Feedlot Abandonment<sup>1</sup> Recommended Procedures", University of Nebraska, G96-1293-A, [www.ianr.unl.edu/pubs/beef/g1293.htm](http://www.ianr.unl.edu/pubs/beef/g1293.htm)
- <sup>23</sup>Preamble, Part II Environmental Protection Agency, 40 CFR Parts 9, 122, 123, and 412 National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitation Guidelines and Standards for Concentrated Animal Feeding Operations (CAFOs); Final Rule, pg. 7229
- <sup>24</sup>"Best Management Practices for Manure Utilization", Colorado State University, Bulletin #XCM-174, August 1994, pg. 2
- <sup>25</sup>"Assessing and Reducing the Risk of Groundwater Contamination from Livestock Waste Storage", KY' A'SYST, ip-45; Kentucky Cooperative Extension Service and US EPA.
- <sup>26</sup>Part II Environmental Protection Agency, 40 CFR Parts 9, 122, 123, and 412 National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitation Guidelines and Standards for Concentrated Animal Feeding Operations (CAFOs); Final Rule, pg. 7265,
- <sup>27</sup>"Producers' Compliance Guide for CAFO's", Environmental Protection Agency, EPA-821-R-03-010, November 2003
- <sup>28</sup>Halverson, Marlene, "The Price We Pay For Corporate Hogs", Institute for Agricultural and Trade Policy, 2000, pg. 48
- <sup>29</sup>United States Department of Agriculture Producers, Soil Conservation Service, "Agricultural Waste Management Field Handbook", (April 1992) Chapter 3
- <sup>30</sup>Campagnolo, Enzo et al., "Report to the Iowa Department of Public Health on the Investigation of the Chemical and Microbial Constituents of Ground and Surface Water Proximal to Large-Scale Swine Operations, (October-December 1998) pg. 4 <http://water.usgs.gov/owq/AFO/proceedings/afo/index.html>
- <sup>31</sup>Halverson, Marlene, "The Price We Pay For Corporate Hogs", Institute for Agricultural and Trade Policy, 2000, pg. 48
- <sup>32</sup>Harris, Stephanie I. DVM, review study for "Care Vs. Henry Bosma Court Case." Evaluation of Potential Risk to Human Health Associated with Alleged Manure Discharges from Henry Bosma Dairies into waters of the United States, (Richland Washington, 1999)
- <sup>33</sup>"Assessing and Reducing the Risk of Groundwater Contamination from Livestock Waste Storage", KY' A'SYST, ip-45; Kentucky Cooperative Extension Service and US EPA.
- <sup>34</sup>"Assessing and Reducing the Risk of Groundwater Contamination from Livestock Waste Storage", KY' A'SYST, ip-45; Kentucky Cooperative Extension Service and US EPA.
- <sup>35</sup>"Animal Waste Management To Protect Water Quality", Alabama A&M and Auburn Universities, Alabama Cooperative Extension System, ANR-790-4.6.1
- <sup>36</sup> "Living With Hogs in Iowa: The Impact of Livestock Facilities on Rural Residential Property Values," on the ISU Center for Agricultural and Rural Development's Web site: [www.card.iastate.edu](http://www.card.iastate.edu); **Feeding Operations and Proximate Property Values**" by John Kilpatrick, July 2001 issue of The Appraisal Journal; The Impacts of Animal Feeding Operations on Rural Land Values, Mubarak Hamed, Thomas G. Johnson, Kathleen Miller; Community Policy Analysis Center University of Missouri-Columbia