

THE EVOLUTION AND PROSPECT OF REGULATIONS FOR CONCENTRATED ANIMAL FEEDING OPERATIONS

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CONCENTRATED ANIMAL FEEDING OPERATIONS

The livestock and poultry production industry is continuing a trend of concentration of animals on larger farms throughout the nation. This trend is driven by a number of factors such as economics and urbanization. As smaller farms close operations, the remaining farms must grow to meet production demands. Out of approximately 640,000 livestock farms in the United States, 450,000 farms are operated as confined feedlots. Approximately, 6,600 of those animal feeding operations account for about 35% of the total U.S. livestock production (Harkin, 1997).

This intensification of the industry has resulted in an expanding environmental problem: animal waste management. Nationwide, 130 times more animal manure is produced than human waste resulting in approximately five tons for every person in the United States. The manure from a 200 head dairy produces as much nitrogen as the sewage from a community of 5,000 to 10,000 people (Harkin, 1997). The State of Texas, a leader among the nation in livestock production, ranks high in animal waste production as well. In Texas, approximately 230,000 dairy cows, 3.9 million beef cattle, 1.9 million hogs, and 7.6 million chickens produce approximately 10.6 million tons of dry manure at permitted facilities each year.

The industry has responded to the problem by managing manure as a resource rather than a waste product. Animal manure and wastewater contain high concentrations of nutrients needed for production on agricultural croplands and pasturelands. Nutrient concentrations in manure are highly variable depending upon factors such as animal feeding rations and manure storage and handling methods. Studies indicate that up to 75% of the nitrogen fed to dairy cattle is excreted in manure. Concentrations of nitrogen in manure at the time of land application average 28 lbs/ton for a dairy

(McFarland, 1996). Thus, land application of manure and wastewater has become the most common method for disposal of animal waste at animal feeding operations.

CONTAMINATION CONCERNS

Ironically, the same nutrients in manure that allow the product to be used as a fertilizer are responsible for contributing to the contamination potential of animal waste. In the previous year, concerns about contamination from concentrated animal feeding operations (CAFOs) have received nationwide attention. In 1997, outbreaks of the toxic microbe *Pfiesteria piscicida* killed approximately 450,000 fish in North Carolina and approximately 30,000 fish in the Chesapeake Bay. These outbreaks were attributed by many to nutrient loading from manure-contaminated runoff from local agricultural operations. Agricultural runoff is the largest contributor of pollution in sixty percent of the rivers and streams that the Environmental Protection Agency (EPA) has identified as *impaired* (Harkin, 1997).

Concerns about contamination from CAFOs focus on both air and water quality issues. Surface water contamination typically results from discharges of overflowing or breached ponds and lagoons or from the tailwater runoff of application fields. Ground-water contamination may result from improperly constructed ponds and lagoons or from improper siting of the operations on sensitive recharge zones. Water contaminated by manure may include pathogens, nitrate, ammonia, phosphorus, and salts. Air quality issues include fugitive dust emissions and animal waste odors. The most commonly filed complaint regarding CAFOs is the emission of odors leading to nuisance conditions. Animal manure odor contains compounds that are the intermediate and final products of biodegradation, and includes these groups: ammonia and amines; sulfides; volatile fatty acids; alcohols; aldehydes; mercaptans; esters; and carbonyls (Sweeten, 1991).

REGULATORY CHRONOLOGY

As the risk of contamination has grown with the development of the livestock and poultry industry, state and federal governments have assumed responsibility for protecting the nation's environment from this hazard. The regulatory overview of animal feeding operations has evolved over the past forty years in an attempt to keep pace with changing public perception, technological progress and industry. The development of CAFO regulations in Texas has advanced on two fronts: air quality and water quality.

Air Quality

The Federal Clean Air Act of 1963 provided authority to establish air quality standards. The 1970 Clean Air Act Amendments required the EPA to establish National Ambient Air Quality Standards and provided that each state develop a State Implementation Plan to assure attainment of air quality standards by 1977. To carry out its powers and duties under the Texas Health and Safety Code, the Texas legislature created the Texas Air Control Board (**TACB**) in 1965. After passage of the Texas Clean Air Act, the TACB adopted Chapter 116 in Title 30 of the Texas Administrative Code (TAC), otherwise known as Regulation VI. Regulation VI established criteria that must be met before a permit for a new source will be issued to animal feeding operations exceeding 1,000 head. Permitting exemptions were later adopted in Title 30 TAC Chapter 106, Subchapter F.

Water Quality

The Federal Clean Water Act of 1972 provided that no point source may discharge except in accordance with the National Pollutant Discharge Elimination System (**NPDES**). The act also required each state to develop and implement Total Maximum Daily Loads for all pollutants expected to prevent the attainment of water quality standards. The 1987 Clean Water Act Amendments established the Section 319 Nonpoint Source (**NPS**) Program providing for a statewide assessment of all NPS pollution. To carry out its powers and duties under the Texas Water Code, the Texas legislature created the Texas Water Commission (**TWC**) in 1962. In 1987, the TWC adopted Title 30 TAC Chapter 321, Subchapter B entitled *Livestock and Poultry*

Production Operations. Subchapter B provided a commission policy of no discharge from animal feeding operations and a permitting process for facilities classified as CAFOs.

Sections 301(a) and 502(14) of the Clean Water Act designate CAFOs as point sources that are subject to the NPDES permits program. In March of 1993, Region VI of the EPA issued a General Permit for CAFOs which established technical and procedural requirements for federal authorization to discharge under the NPDES program. Also in that year, the 73rd Texas Legislature passed Senate Bill 503 that allows the Texas State Soil and Water Conservation Board (**TSSWCB**) to assist small agricultural and silvicultural facilities in meeting water quality requirements in the state through financial assistance and the development of certified water quality management plans. In doing so, the TSSWCB became the lead agency for regulatory overview of NPS contamination including animal feeding operations that are not designated as a CAFO.

Multi-Media Regulations

On September 1, 1993, the TACB and the TWC merged to form the Texas Natural Resource Conservation Commission (**TNRCC**). With both air and water regulatory agencies combined, the TNRCC initiated a new emphasis on multi-media permitting. In 1995, the TNRCC promulgated regulations in Title 30 TAC Chapter 321, Subchapter K with the following objectives: 1) include consolidation of air and water quality permitting processes and requirements; 2) provide consistency between both federal and state requirements; 3) grant a performance-based permit founded upon development and implementation of a site-specific Pollution Prevention Plan (**PPP**); 4) require certification of whether or not ground and surface water recharge features exist near pollutant sources; 5) require development of a final site plan; and 6) support an efficient and objective public notice and comment procedure. The Subchapter K regulations authorized operations according to a permit-by-rule as allowed under Section 26.040 of the Texas Water Code.

After the first authorizations were issued under the new Subchapter K regulations in 1995, the TNRCC was named as a defendant in a lawsuit against the regulations filed by a group of citizens protesting the movement of large swine operations

into the Texas Panhandle. The lawsuit was heard by the 353rd District Court under the direction of Judge Margaret Cooper. After deliberations, the judge indicated on February 3, 1998, that her final ruling will declare the Subchapter K regulations invalid because they did not contain a reasoned justification.

At that time, all applications under Subchapter K were suspended and returned to the applicants.

NEW REGULATORY INITIATIVES

Although significant progress has been achieved through current regulatory programs, it has not adequately addressed the scope of today's environmental problems. State and federal governments are developing strategies in response to growing public concern. The following rules or regulatory initiatives are in progress or on the horizon.

State Regulations

In the wake of the revocation of the Subchapter K rules, the TNRCC has been actively involved in the development of new regulations. The purpose of the proposed rules is to create a variety of options available for the regulation and authorization of air emissions and water discharges by CAFOs, tailored according to regulatory needs including the size and nature of the facilities, statutory requirements, and the necessary administrative burdens both on the commission and on the dischargers.

State General Permit

House Bill 1542 of the 75th Texas Legislature (1997) amended §26.040 of the Texas Water Code to allow the TNRCC to authorize the discharge of wastewaters through the issuance of general permits. Discharges under such general permits are limited to no more than 500,000 gallons in a 24-hour period. The TNRCC published notice of the proposed general permit in the state register March 6, 1998.

Revised Subchapter B

Since the Subchapter K regulations were ruled invalid by the court, the TNRCC has proposed new revisions to the existing Subchapter B regulations. As amended, this subchapter will offer or require, as appropriate, authorization by individual

permit or by registration under a permit-by-rule. In combination with the general permit, these regulatory options will provide a full spectrum of options for TNRCC to regulate CAFOs by suitable and efficient means. The TNRCC published notice of the proposed rules in the state register March 6, 1998.

All CAFOs that will be authorized under the revised Subchapter B will be required to document any design and practice used to protect the state's air and water quality and assure compliance with the limitations and conditions of state regulations. This documentation must be developed in the form of a PPP. The PPP must be prepared in accordance with good engineering and agronomic practices and should include measures necessary to limit the discharge of pollutants into waters in the State and nuisance conditions.

The PPP must describe all potential pollutant sources located at each facility as well as all structural and management controls appropriate for each identified pollutant source. Structural controls may include the proper design and construction of retention facilities, liners, berms and diversions. Management controls may include waste and wastewater removal, handling and land application; soil, manure, and wastewater testing; and inspections, monitoring, reporting and record keeping. The PPP shall also document all Best Management Practices (**BMP**) that will be utilized in the operation.

Poultry Regulations

Existing and future poultry operations across the state of Texas will have to comply with new requirements outlined in Senate Bill 1910 passed by the 75th Texas Legislature. Senate Bill 1910 amends Chapter 26 of the Texas Water Code to establish a regulatory scheme for ensuring that poultry operations have adequate means to handle and dispose of poultry carcasses, poultry litter and other poultry waste. The bill directs the TNRCC to promulgate rules to prohibit on-site burial of poultry carcasses and specify methods for proper disposal within 72 hours of death. The rules will be developed and will take effect no earlier than March 1, 1999.

National Pollutant Discharge Elimination System

On February 5, 1998, the TNRCC submitted an application to the EPA to request partial assumption of the NPDES program. The application

requests authority to administer NPDES permitting, compliance monitoring and enforcement activities, NPDES pre-treatment activities, and NPDES sewage sludge program activities in Texas.

Federal Regulations

Currently, livestock odors are not regulated by federal statutes nor is the handling, storage, or application of animal waste addressed in federal regulations. Furthermore, the Inspector General of the EPA reported recently that "Federal regulations inadequately protect water quality from animal waste" (Harkin, 1997). This evaluation, as well as recent cases of contamination, have prompted considerable activity at the federal level.

Animal Agriculture Reform Act

In October of 1997, Senator Tom Harkin introduced the Animal Agriculture Reform Act in the United States Senate. The bill calls for national environmental standards for the handling of animal waste by large animal feeding operations. These standards would be implemented through mandatory animal waste management plans approved by the United States Department of Agriculture (**USDA**). The bill does not interfere with the regulatory role of the EPA or state governments. Instead, it provides a directive for USDA to implement waste management standards on individual farms (Harkin, 1997).

Clean Water Action Plan

Through the collaboration of ten federal work groups, USDA and EPA jointly submitted a Clean Water Action Plan in February, 1998. Included in the Clean Water Action Plan is a strategy to substantially reduce pollution from animal feeding operations. The Plan calls for a unified EPA/USDA National Animal Feeding Operation Strategy to include elements such as:

- Coordinate interagency cooperation
- Develop and implement management systems
- Revise and strengthen regulations
- Provide incentives for environmental protection
- Develop a plan for research
- Develop watershed nutrient budgets
- Target priority watersheds
- Establish a certification program

The unified strategy will be published for public review and comment in July, 1998 and will be finalized in November, 1998 (EPA, 1998).

EPA General Permit

The existing EPA General Permit will expire in March, 1998 and must be reissued at that time. The proposed EPA General Permit retains most of the same content and format as the existing permit. However, some modifications have been proposed, including the additional requirements of a manure management plan and a nutrient utilization plan. The manure management plan specifies site-specific procedures to dispose solids, sludges, manure and other pollutants generated at the facility. Each plan must describe the methods for and account for, the disposal of all manure and wastewater generated by the facility.

If the proposed methods of disposal include land application of manure and wastewater, the facility must develop a site-specific nutrient utilization plan. The nutrient utilization plan must include the following:

- A site map showing the proposed land application areas
- Crop rotations
- Methods and procedures for analyzing nutrients in the soils, manure and wastewater
- Predicted yield goals based on the major soil types
- Procedures for calculating nutrient budgets to be used to determine application rates
- Equipment to be used in land application and the procedures for inspecting and maintaining such equipment
- Projected rates and timing of application

The nutrient utilization plan must include (1) specific details for nutrient sampling and testing of soils, manure, and wastewater, and (2) the basis for determining agronomic rates of manure and wastewater application. The permittee must establish, with the assistance of the NRCS, the threshold phosphorus holding capacities for all major soil types within the land application areas. Each permittee who plans to dispose of manure or wastewater by land application must certify that the manure and wastewater will be applied at rates that are within the agronomic nitrogen and phosphorus

needs of the crops or pasture produced and that the agronomic rates will be calculated by using results of nutrient testing of soils, manure, and wastewater.

REGULATORY CHALLENGES

As state and federal agencies consider and enact new regulations, we are confronted with new challenges in animal waste management. These challenges require new perspectives and innovative initiatives. The most challenging environmental problem facing the livestock and poultry production industry today is the control and prevention of NPS pollution. With the adoption of the Subchapter B rules regulating animal feeding operations in 1987, attention was directed toward the significant number of facilities in the state operating without any structural controls. Since then, much progress has been made fostering the development of waste management plans and construction of structural controls to prevent pollution. However, only recently has awareness grown regarding the environmental problems of NPS pollution.

For animal feeding operations, controlling NPS pollution suggests focusing on the development of management controls rather than the construction of structural controls. The most significant contributor of NPS pollution from an animal feeding operation is the management practice of land application of manure and wastewater.

The TNRCC has outlined specific requirements for the management of manure and wastewater application. The PPP must include all methods and frequency for waste and wastewater disposal including a description of waste handling procedures and equipment availability, calculations and assumptions used for determining land application rates, crop management systems and any nutrient analysis data. The following BMPS are recommended:

- Waste and wastewater shall not be applied to land when the ground is frozen or saturated or during rainfall events.
- Application rates shall not exceed the nutrient uptake of the crop coverage or planned crop planting with any land application of wastewater and/or manure. Timing and rate of applications shall be in response to crop needs, assuming usual nutrient losses, expected precipitation and

soil conditions. Land application rates of waste and wastewaters should be based on the available nitrogen content; however, where local water quality is threatened by phosphorus, the permittee shall limit the application rate to the recommended rates of available phosphorus for needed crop uptake and provide controls for runoff and erosion as appropriate for site conditions.

- Irrigation practices shall be managed so as to reduce or minimize ponding or puddling of wastewater on the site, contamination of waters in the state, and the occurrence of nuisance conditions.
- Discharge (run-off) of waste from the application site is prohibited. All necessary practices to minimize waste manure transport to waters in the state shall be utilized and documented in the plan.
- Edge-of-field, grassed strips shall be used to separate water courses from runoff carrying eroded soil and manure particles. Land subject to excessive erosion shall be avoided.
- Nighttime application of liquid and/or solid waste shall only be allowed in areas with no occupied residence(s) within 0.25 mile from the outer boundary of the actual area receiving waste application. In areas with an occupied residence within 0.25 mile from the outer boundary of the actual area receiving waste application, application shall only be allowed from one hour after sunrise until one hour before sunset, unless the current occupants of such residences have agreed in writing to such nighttime applications.

An inherent problem with land application of manure pertains to the build-up of phosphorus. Because a significant amount of nitrogen volatilizes to the atmosphere, application of manure at nitrogen rates usually results in an overapplication of phosphorus. Phosphorus accumulates in the soil because it is generally considered to be immobile. The phosphorus that is bound to soil particles can then become a contaminant through erosion and surface runoff into local streams.

To investigate this problem, the TNRCC randomly selected 21 dairies in the Central Texas Dairy Outreach Program Area (DOPA) to conduct soil sampling for a Manure Application and Soil

Nutrient Monitoring Project in cooperation with the Texas Agricultural Extension Service (TAEX). In 1997, soil samples were collected in application fields by TNRCC investigators during routine compliance inspections and were analyzed at the TAEX Plant, Soil and Water Testing Laboratory in College Station. The results indicated that of the 21 application fields, 43 percent contained high levels of phosphorus. Operators had to reduce applications to phosphorus-based rates or use alternative fields for application of manure.

The TNRCC and TAEX are addressing this problem by providing education and technical assistance to the owners and operators. The success of management controls and their implementation depends upon the operator's experience and training. The assistance provided includes recommendations on application methods, timing and rates for major and minor nutrients. Furthermore, the agencies have established an education and training program for dairy operators in the DOPA. The program periodically provides continuing education courses in animal waste management training each year in Central and East Texas.

SUMMARY

The management of animal waste from CAFOs is presenting challenging environmental problems for the industry and the State of Texas. To protect the air and water in the state, TNRCC has been authorized to regulate the management of livestock and poultry waste from CAFOs in Texas. The Agriculture Section of TNRCC is committed to working with animal feeding operations in the selection, implementation, and use of environmentally sound BMP, and related technologies for collecting and utilizing animal wastes. Questions regarding the Agriculture Section of the TNRCC may be directed to the TNRCC, Agriculture Section (MC-158), PO Box 13087, Austin, Texas 78711-3087, (512) 239-3410 or by visiting our web site at www.tnrcc.state.tx.us.

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