Improving the Competitiveness of Missouri’s Animal Agriculture: Regulations and Water Quality

Commercial Agriculture Program
Manure Management Team
University of Missouri

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**Project Team**

The Manure Management Team of the Commercial Agriculture Program at the University of Missouri completed this project.

The Manure Management Team is an interdisciplinary group of faculty in agricultural economics, agronomy, agricultural engineering, animal science, and veterinary medicine.

This team is one of several teams in the Commercial Agriculture Program whose mission is to create new opportunities for Missouri entrepreneurs dedicated to profitable and sustainable agriculture and food systems.

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Table of Contents

CHAPTER 1: INTRODUCTION ............................................................................................................ 1

1.1 THE CHALLENGE ......................................................................................................................... 1

1.2 OUR APPROACH ........................................................................................................................... 2

1.3 PROJECT DELIVERABLES ............................................................................................................. 3

1.4 FRAMEWORK FOR ANALYSIS ..................................................................................................... 4

1.5 PROJECT LIMITATIONS ............................................................................................................... 6

CHAPTER 2: SUMMARY OF RECOMMENDATIONS .......................................................................... 7

2.1 RECOMMENDATIONS THAT SHOULD IMPROVE COMPETITIVENESS OF MISSOURI WHILE IMPROVING OR HAVING A NEUTRAL EFFECT ON WATER QUALITY WITHIN THE STATE ........................................... 8

2.2 RECOMMENDATIONS THAT SHOULD IMPROVE WATER QUALITY IN MISSOURI WHILE POTENTIALLY REDUCING OR HAVING A NEUTRAL EFFECT ON THE COMPETITIVENESS OF MISSOURI AGRICULTURE ...... 26

2.3 STATE REGULATORY ABSTRACTS ............................................................................................. 30

CHAPTER 3: FEES AND PERMITS .................................................................................................... 34

3.1 WHO IS REQUIRED TO OBTAIN PERMITS .............................................................................. 34

Appendix 3.1: State-by-state summary ......................................................................................... 36

3.2 CONSTRUCTION AND OPERATING PERMIT FEES ..................................................................... 41

Appendix 3.2: State-by-state summary ......................................................................................... 44

3.3 TIME NEEDED FOR PERMITS .................................................................................................... 48

Appendix 3.3: State-by-state summary ......................................................................................... 50

3.4 TESTS, RECORDS AND REPORTS ............................................................................................... 54

Appendix 3.4: State-by-state summary ......................................................................................... 57

3.5 TRANSFER OF OWNERSHIP FOR PERMITS ............................................................................. 64

Appendix 3.5: State-by-state summary ......................................................................................... 66

3.6 PERMIT MODIFICATION ............................................................................................................ 69

Appendix 3.6: State-by-state summary ......................................................................................... 70

CHAPTER 4: FACILITY DESIGN AND LAND APPLICATION ............................................................ 74

4.1 SETBACKS .................................................................................................................................. 74

Appendix 4.1: State-by-state summary ......................................................................................... 75

4.1.1 Land Application Setbacks ...................................................................................................... 78

Appendix 4.1.1: State-by-state summary ......................................................................................... 78

4.1.2 Facility Separation Distance Requirements ............................................................................ 82

Appendix 4.1.2: State-by-state summary ......................................................................................... 84

4.2 STORAGE DESIGN .................................................................................................................... 89

Appendix 4.2: State-by-state summary ......................................................................................... 90

4.2.1 Storage Period Requirements ................................................................................................ 91

Appendix 4.2.1: State-by-state summary ......................................................................................... 91

4.2.2 Formed Manure Storage Design and Construction ................................................................. 92

Appendix 4.2.2: State-by-state summary ......................................................................................... 93

4.2.3 Earthen (Unformed) Manure Storage Design and Construction ............................................... 94

Appendix 4.2.3: State-by-state summary ......................................................................................... 95

4.2.4 Compaction/Liner Requirements ............................................................................................ 98

Appendix 4.2.4: State-by-state summary ......................................................................................... 98

4.2.5 Site Preparation Requirements .............................................................................................. 100

Appendix 4.2.5: State-by-state summary ......................................................................................... 104

4.2.6 Dry manure storage ................................................................................................................ 106

4.2.6.1 Siting Requirements ............................................................................................................ 109

Appendix 4.2.6.1: State-by-state summary ......................................................................................... 109

4.2.6.2 Structural Requirements ..................................................................................................... 113

Appendix 4.2.6.2: State-by-state summary ......................................................................................... 114

4.3 MONITORING / INSPECTION AND SAFETY ........................................................................... 116

Appendix 4.3: State-by-state summary ......................................................................................... 118

4.4 NUTRIENT MANAGEMENT ..................................................................................................... 123
| Appendix 4.4: State-by-state summary | ................................................................. | 128 |
| 4.5 TRAINING & CERTIFICATION REQUIREMENTS FOR MANURE APPLICATORS | ................................................................. | 133 |
| Appendix 4.5: State-by-state summary | ................................................................. | 136 |
| 4.6 FACILITY CLOSURE | ........................................................................ | 139 |
| Appendix 4.6-1: State-by-state summary | ........................................................................ | 141 |
| Appendix 4.6-2: Facility Closure Options | ........................................................................ | 145 |
| 4.7 MORTALITY MANAGEMENT | ........................................................................ | 147 |
| Appendix 4.7-1: State-by-state summary | ........................................................................ | 149 |
| CHAPTER 5: LOCAL RESTRICTIONS ON ANIMAL FEEDING OPERATIONS | .... | 154 |
| 5.1 LOCAL ORDINANCES AND ANIMAL FEEDING OPERATIONS | ................................................................. | 157 |
| Appendix 5.1: State-by-state summary | ................................................................. | 159 |
| 5.2 WATERSHED LIMITS | ........................................................................ | 164 |
| Appendix 5.2: State-by-state summary | ........................................................................ | 165 |
Chapter 1: Introduction

1.1 The Challenge

Missouri’s livestock and poultry industry is a cornerstone of the state’s agricultural economy averaging $2.5 billion annually in sales from 1983 to 2002 and more than 50% of farm cash receipts each of the last 20 years. Agriculture has an impact in every corner of the state as a key element of the infrastructure and prosperity of small communities. Missouri farmers are the stewards of the land; managing 65% of the land area of the state.

The regulatory environment for Missouri’s livestock facilities is in a period of rapid change. In January 2003 the U.S. Environmental Protection Agency (USEPA) released a major revision to the national regulatory standards for concentrated animal feeding operations (CAFOs). Many states, including Missouri, are in the middle of a two-year process to change state water quality regulations to comply with the new federal standards.

The USEPA has also designated more than 1,900 miles of Missouri streams and 88,000 acres of Missouri’s lakes and reservoirs as having impaired water quality. The state is mandated by USEPA to develop plans for the watershed of each impaired water resource to bring it into compliance with water quality standards. This process is known as the total maximum daily load (TMDL) process. Agriculture, particularly animal agriculture, will have a direct role in efforts to maintain and improve water quality in at least 14% of Missouri’s impaired streams and 50% of its water bodies.

Concerns about water quality and the evolving regulatory climate have resulted in increasing debate and tension between environmental and business advocates on the impact of existing and proposed water quality regulation on the business climate in the state.

- Environmental advocates emphasize our obligation to develop and use management practices that protect water quality and other natural resources.
- Business advocates emphasize that any mandate must consider its likely effect on the viability of Missouri farm enterprises.

The debate is further complicated by regional differences in water resources and farming practices based, in part, on Missouri’s diverse geography.
This project was initiated by the Missouri Department of Agriculture as part of a larger effort to understand the factors which will promote the competitiveness of Missouri’s agriculture regionally, nationally and worldwide. Regulations are frequently the focus of such debates. Understanding the role of regulations in the competitiveness of Missouri agriculture is one step in the Missouri Department of Agriculture’s efforts to define the important factors limiting growth in Missouri’s agricultural sector.

The primary objective of this project was to provide perspective on the impact of Missouri’s regulations on concentrated animal feeding operations.

- How does Missouri’s regulatory climate compare with competing states?
- Do Missouri’s regulations create an obvious disadvantage to Missouri farmers compared to farmers doing business in other states?
- Are there opportunities to improve the competitiveness of Missouri agriculture while protecting water quality?

### 1.2 Our Approach

There were four steps in the University of Missouri analysis of the regulatory climate affecting Missouri animal feeding operations.

1. Develop a framework for evaluating and discussing the relative strengths and weaknesses of water-quality regulations.

2. Complete a comprehensive review of Missouri’s regulation of concentrated animal feeding operations comparing them with regulations in three competing states: Iowa, Indiana and Oklahoma.

3. From the review identify:
   a. Missouri regulations that place Missouri at a competitive disadvantage with competing states.
   b. Identify possible changes in Missouri regulations that would improve the competitiveness of Missouri agriculture without affecting water quality.

4. Prioritize and present recommendations for changes in Missouri regulations for concentrated animal feeding operations based on the framework developed in step 1.
1.3 Project Deliverables

This report contains recommendations based on a detailed evaluation of regulations affecting concentrated animal feeding operations. It also contains detailed side-by-side comparison of regulations in four targeted states and lists the regulations and statutes that were the sources of this information.

Specific deliverables include:

- A framework for prioritizing proposed changes to Missouri regulations for concentrated animal feeding operations. Chapter 1 (section 1.4).

- Project recommendations. Chapter 2.

- A summary of the regulatory climate in each of the four states included in our analysis (Missouri, Iowa, Indiana and Oklahoma). Chapter 2 (section 2.3).

- Comprehensive listing of state regulations affecting concentrated animal feeding operations. Chapters 3, 4 and 5.
  - Fifteen sections address primary areas of regulation.
  - Highlights and Impacts summarize key issues in each section.
  - Tables in each section compare regulations among the four states.
  - Appendices in each section list specific state requirements and cite controlling state regulations and statutes.

- Comprehensive analysis of local restrictions affecting Missouri animal feeding operations. Chapter 5.
  - Comprehensive listing of county and township ordinances affecting concentrated animal feeding operations.
  - Detailed maps of critical watersheds and agriculture-related impaired water resources.
  - Analysis of the number of existing permitted Missouri operations affected by local restrictions.

The critical reader can use the supporting chapters to review the specific regulations addressed in our recommendations. They can also use the regulatory citations included in each chapter to locate the specific regulations we used to develop this analysis.

The intent was to provide the critical reader easy access to the specific regulatory comparisons we used in the analysis.
One objective of this project was to develop a framework for discussing relative strengths and weaknesses of water quality regulations affecting animal feeding operations. Much of the conflict in regulatory discussions has a tendency to focus on disagreements between competing business and environmental interests. At times these interests have competing objectives; in which case, a common language will have limited impact. However, in many cases, there is no inherent conflict of interest and the dispute is driven primarily by a lack of understanding of the impact of a proposal on water quality and business viability.

The competitiveness – water-quality comparison matrix provides a common framework to discuss regulatory proposals (Figure 1). This type of matrix provides a language and framework to help both the business and environmental communities focus debate on real differences while promoting cooperation in areas of consensus.

![Competitiveness - Water-Quality Comparison Matrix](image)

Figure 1. Competitiveness – water-quality comparison matrix for regulatory issues affecting animal feeding operations.
The matrix can also be used to develop a protocol for action once an issue is categorized:

1. Water quality initiatives that promote or are neutral to business competitiveness (blocks 1 and 2) should be promoted by both environmental and business interests as being beneficial to the state.

2. Business initiatives that have beneficial or neutral effects on water quality (blocks 1 and 4) should be promoted by both environmental and business interests.

3. Public debate of water regulations should focus on blocks 3 and 7, where a clear benefit to one constituency (business competitiveness or water quality) is coupled with a clear cost to the other.

4. Issues that are neutral to each group (block 5) should be dropped unless they promote the interests of another legitimate constituency.

5. Issues in the remaining blocks (6, 8, and 9) should be dropped because they have a negative impact on one sector with no benefit to the other.

In developing each discussion of current rules and ultimately recommendations in this study, project managers considered the relative impact of a rule on water quality and assessed whether existing or proposed rules would make it more difficult to compete with other states.

Each recommendation is accompanied by a visual cue highlighting our assessment of the elements of the competitiveness-water-quality matrix applicable to that recommendation.
1.5 Project Limitations

This is a point in time analysis reviewing regulations in early 2004. States are continuously fine-tuning regulations affecting animal feeding operations and that trend is likely to continue. Substantial changes to regulations are anticipated in all states during 2004 and 2005 as they modify state regulations to comply with the USEPA revised concentrated animal feeding operation regulations promulgated in January 2003. This analysis captures state regulatory requirements before they implement revisions required by the revised USEPA regulations for confined animal feeding operations. However, it does give a solid baseline of comparison between the regulatory environment in Missouri and competing states as we move into this phase.

The team did a detailed comparison of water quality regulations in four states: Missouri, Indiana, Iowa, and Oklahoma. The three states selected for our initial comparison to Missouri were selected because their proximity and predominant agriculture made them likely to compete for farmers considering expansion of existing or building new animal feeding operations. In that analysis we considered whether Missouri regulations posed a competitive advantage or disadvantage to the other three states. We also considered whether there was a clear water quality basis for the differences among the four states.

Each recommendation in Chapter 2 is supported in a subsequent chapter in the report with referenced rules under consideration. Each chapter, in turn, includes an appendix detailing the specific context of the rules evaluated in each state as well as source documentation of state regulations where the information resides.

This report highlights opportunities to improve the effectiveness of Missouri’s regulations and reduce their impact on the competitiveness of Missouri agriculture. Some suggestions will require additional technical development if they are going to be implemented into regulations.
Chapter 2:  
Summary of Recommendations

This chapter highlights opportunities to improve the competitiveness of Missouri’s agriculture and/or improve the effectiveness of Missouri’s water quality regulations.

The following recommendations are a product of an extensive comparison of Missouri’s regulations with those in Iowa, Indiana and Oklahoma by the University of Missouri Commercial Agriculture Manure Management Team.

The report divides 22 recommendations into two sections.

Recommendations that should improve the competitiveness of Missouri agriculture while improving or having a neutral effect on water quality within the state (Section 2.1)

Recommendations that should improve water quality in Missouri while potentially reducing or having a neutral effect on the competitiveness of Missouri agriculture (Section 2.2)

The final section of this chapter is a brief abstract of the regulatory climate in each of the surveyed states (Section 2.3).
2.1 The following recommendations should improve the competitiveness of Missouri while improving or having a neutral effect on water quality within the state

1. Missouri should develop alternative permitting criteria that considers the likelihood of a discharge and the efficiency of nutrient use on the farm. Operations with low potential to discharge and high utilization of nutrients should be rewarded with lower regulatory scrutiny.

This proposal would improve water quality and business competitiveness (block 1). See chapter 3.1 for further information.

Permitting operations has a valid water quality benefit when the focus of regulatory attention is on those operations most likely to cause water quality degradation. All states including Missouri primarily use size criteria to determine who needs a permit.

There are aspects of the permitting process where size clearly is a good surrogate for water quality vulnerability. The potential impact of a spill from liquid manure storage clearly increases with the size of the operation. However, the size connection between water quality and land application is less clear. A large operation that efficiently utilizes nutrients entering the farm through animal and crop production poses a lesser water quality threat than a smaller, less efficient operation.

We propose that criteria be developed that would reward operations that have manure management systems with low or no potential to discharge. Similarly we recommend a system that would reward operations that efficiently use the nutrients entering the farm as feed. Operations that are less efficient could potentially require more environmental regulation than operations that are more efficient, regardless of size. Such a system would benefit water quality by focusing regulatory requirements on those operations where nutrient inputs are out of balance with land resources.
2. Missouri should create and maintain a central clearinghouse where local and state entities would be required to post any regional restrictions that are more strict than requirements outlined in state law regarding animal feeding operations and other business activity.

This proposal would potentially improve water quality and business competitiveness (block 1). See chapter 5 for further information.

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There is a diverse patchwork of regulations and requirements across Missouri that impose additional restrictions compared to the statewide confined animal feeding operation regulations. These restrictions derive from county and township health and zoning ordinances, state regulatory designation and federal and state water quality standards. The most extensive source of potentially more restrictive requirements for CAFOs is the USEPA mandate to clean up streams and water bodies designated as impaired on each state’s 303(d) list. All the surveyed states have watersheds where agriculture will play a role in improving water quality in these impaired water resources.

Currently, much of this information is difficult to obtain by producers or investors because it resides in many locations. It is difficult for a person considering expansion of an existing operation or building a new operation to determine which of these local restrictions may apply to them. The technology is available to combine all of these potential restrictions and their spatial extent on an interactive map available for public access on the worldwide web.

There currently is a real risk of farmers initiating expansion of existing or new operations without being fully aware of local restrictions. Greater access to this information would improve water quality by discouraging expansion of animal production in areas designated as sensitive. Business competitiveness would be improved by reducing uncertainty by reducing the likelihood of initiating new operations without full awareness of all the controlling authorities.
3. We recommend efforts to insure that regional restrictions clearly benefit water quality and public health:

- Entities creating local controls more stringent than state regulations should be required to state the specific mechanism by which the rule will protect water quality and/or public health.
- The state should provide resources and support mechanisms that provide local stakeholders the information they need to make an educated decision on local limits.
- Existing permitted operations should receive grandfather protection from local changes.

This proposal would likely have a positive or no effect on water quality while improving business competitiveness (blocks 1 or 4). See chapter 5 for further information.

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These recommendations seek to promote implementation of science-based rules by local entities and discourage the most punitive aspects of local rulemaking. Asking purveyors of local rules to clearly state the water quality or public health basis of each rule would help insure there is a connection between proposed rules and fees and their intended objectives. Local entities do not always have the resources or the awareness of resources available to develop a clear scientific basis for proposed rules. The lack of technical support to the local rulemaking process may be one of the reasons for the lack of a clear water quality basis for some of these rules. Any support the state can provide to watersheds, counties and townships undergoing a local rulemaking process should help insure the rule will meet water quality goals.

Grandfathering requirements for existing operations is an important element of local rulemaking. It prevents punitive rules aimed at driving out existing businesses. There is a large difference between a process that convinces a new investor not to initiate an enterprise because of local restrictions versus forcing an existing operation out of business or to incur a large expense due to rules imposed after permitting of the operation.

We did not specifically endorse a legislative limit on the ability of counties to create local limits. Such legislation is attractive because of the clear objective of many of these local limits to severely hamper business competitiveness. However loss of this mechanism eliminates the opportunity for local control, an important element of environmental protection. Banning local ordinances is neutral or positive for business competitiveness but neutral or negative for water quality. Our alternative recommendation preserves some local options for local control while promoting more technically sound rule making at the local level.
4. Operating permits should be issued with construction permits, contingent on certification that the facility was built to permit specifications.

This proposal would likely have a positive or potentially no effect on water quality while improving business competitiveness (blocks 1 or 4). See chapter 3.3 for further information.

Operations are particularly sensitive to delays after facilities are built but before they are put in use. Missouri currently requires operations to submit an application for an operating permit separate from the construction permit. Operators of new facilities can be subject to unanticipated delays as they wait for approval of an operating permit for an already constructed facility.

A more efficient and protective process would require an operation to submit sufficient and defined information necessary for issuing both a construction and a conditional operating permit. Operations would simultaneously be issued a construction and a conditional operating permit. The operating permit would be activated after inspections confirmed the facility was constructed as designed. This would protect water quality by approving the entire construction and operating permit as one entity. Resolving operating permit disputes after construction creates unnecessary business risk and uncertainty to the animal feeding operation owner/operator with no apparent water quality benefits.
This proposal would likely have no effect on water quality while improving business competitiveness (block 4). See chapter 3.3 for further information.

Missouri’s current regulatory structure includes time limits but has no meaningful penalty for the regulatory agency that fails to meet the limit. Consequently there can be indeterminate delays in the permitting process.

Business competitiveness is negatively affected by a permitting process that has no meaningful time limits. Operators are sensitive to unanticipated or undefined delays prior to and during construction, as well as prior to startup of the operation. Capital providers are hesitant to finance a business where uncertainty regarding permit approvals creates unexpected cash flow needs.

The state benefits from the economic growth and job creation of efficient businesses if enforceable time limits were put in place. Provision of sufficient resources to DNR to accomplish permit issuance within the time limit is essential.

Reasonable time limits in the permitting process have no negative impacts on water quality as long as they are provide sufficient time for review of applications.
There are opportunities to protect water-quality while reducing land application setbacks in Missouri:

- Reduce setbacks from certain water resources when vegetated buffers are used as is done in the revised USEPA-CAFO regulations.
- Adjust land application setback distances based on land application methods for all permitted operations.

This proposal would likely have no effect on water quality while improving business competitiveness (block 4). See chapter 4.1.1 for further information.

Setbacks for land application are designed to prevent transport of relatively small concentrations of manure spread on fields for use as a fertilizer into lakes, streams, wells and other water resources. The types of setbacks and the size of setbacks vary among states. Each state has different resources, geographical features and climate that contribute to differences in required setbacks to promote environmental quality.

Missouri’s current setback requirements have two inconsistencies with other standards. Site-specific permits allow reduced setbacks with injection of manure but this is not available to operations under the general permit. The revised national USEPA CAFO regulations allow reduced setbacks when they are maintained as permanent vegetative setbacks. This reflects research data showing that setbacks can also be reduced without reducing water quality when they are maintained as permanent vegetative setbacks.
7. Missouri should evaluate the environmental impact of setbacks that have no clear water quality benefits and either eliminate them or justify them with other more pertinent legislation (e.g. air quality or zoning). Examples include:

- Facility setbacks from residences and public areas.
- Larger facility setbacks from water features.

This proposal would likely improve or have no effect on water quality while improving business competitiveness (blocks 1 or 4). See chapter 4.1.2 for further information.

The rationale of setbacks under the Clean Water Act is that imposing a minimum distance between a facility and a water feature or resource will reduce the potential movement of contaminants into water. Facility setbacks from water resources can have a water quality benefit if they prevent movement of manure from the facility to the water resource. Liquid storage facilities have the potential for failure, leakage or seepage losses. However, the concept that extensive setbacks (0.5 miles to 3 miles in most states) have a direct impact on water quality is doubtful. Such setbacks may not even prevent transport of leaks to a water resource if a tributary passes close to the storage, providing a conduit for water transport. Other strategies such as secondary containment and more conservative engineering standards would likely be more effective at insuring water quality objectives than larger setbacks.

Setbacks for residences and public areas also have little demonstrable effect on water quality. Such standards may have a basis in reducing odor impacts on neighbors or fulfill zoning type objectives to prevent certain types of businesses near residential or public areas. Facility setbacks are an area of regulation that more than any other demonstrates the incorporation of objectives beyond water quality into our water quality regulations in Missouri and other states. Such distractions weaken the effectiveness of water quality regulations by imposing less effective strategies and confusing the rationale used to protect water quality.
8. Missouri should consider reducing site-specific permit fees to encourage adoption of innovative technologies by smaller operations and to align site-specific fees with competing states.

This proposal would potentially improve water quality and business competitiveness (block 1). See chapter 3.2 for further information.

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Fees typically are charged to provide cost recovery for regulatory activities. There is potential for punitive use of permit fees through inequitable fee structures. There is also potential for fees to reduce water quality if they discourage changes by an operation that would improve water quality.

Missouri operations that adopt innovative technologies for manure management would likely be required to obtain a site-specific permit. Permit fees are substantially higher for the site-specific permit compared to the general permit. For example, annual fees are $5,000 for a site-specific permit whereas general permit fees are $150 for five years. This differential in permitting costs could reasonably be considered a disincentive to smaller operations considering affordable, innovative technologies that are neutral or beneficial to water quality.

Higher site-specific permit fees compared to general permit fees in Missouri reflect the higher costs to Missouri Department of Natural Resources associated with managing these permits. However, these fees are substantially greater in Missouri than in Iowa and Indiana. This suggests that other states spend less money managing site-specific permits or hold permit fees below cost.
Upon the sale of a business allow the transfer of general permit to the new owner contingent upon the new owner following the terms of the permit.

This proposal would likely have no effect on water quality while improving business competitiveness (block 4). See chapter 3.5 for further information.

Transfer of ownership has no anticipated effect on water quality because the operation would continue to operate under the conditions of the existing permit. This would be a substantial benefit to the farmer because it removes uncertainty that the facility will continue to operate through an ownership transfer. Capital providers would have a greater interest in this model for the same reason. This mechanism is allowed for site-specific permits so there is no clear reason for it not being allowed for general permits (smaller operations).

A transfer of ownership fee could be charged to cover regulatory agency expenses.
10. Missouri should re-examine its certification requirements (and educational programs) of manure applicators and managers to ensure that they have clear environmental quality benefits.

This proposal would likely improve or have no effect on water quality while improving business competitiveness (blocks 1 or 4). See chapter 4.5 for further information.

Certification acknowledges a level of knowledge or proficiency gained either by education, experience or both. Presumably certified professionals are better equipped and more likely to comply with regulations and protect water quality.

Yet, Missouri has significantly more stringent requirements for large CAFOs than the other states evaluated in this analysis. Training requirements in Missouri include 10 times more hours of training and a requirement of prior experience for certification than the other surveyed states. No other state certification requirements of manure applicators and managers are as great.

The current certification requirements could lead to a shortage of certified applicators and are likely to discourage non-Class IA operators from voluntarily acquiring training.
11. A barrel test or other test to document seepage rate should not be required on a lagoon that is inspected and certified by a professional engineer to be properly constructed. Tests should only be conducted if there is reason to suspect seepage rates in excess of the allowable seepage rate.

This proposal would likely have no impact on water quality while improving business competitiveness (block 4). See chapter 4.2.4 for more information.

Missouri requires certification and inspection of the lagoon seal by a professional engineer on Class IA operations. Additionally, after a lagoon liner has been inspected and certified by a professional engineer as being properly constructed, Missouri still requires a barrel test to monitor the seepage rate of the clay liner. This adds cost to the lagoon building process and may cause delays.
Eliminate site-specific permits monitoring and testing requirements that cannot be justified based on agronomic and/or water-quality concerns associated with an agricultural enterprise.

This proposal would likely have no impact on water quality while improving business competitiveness (block 4). See chapters 3.4, 4.3 and 4.4 for more information.

There are clear water quality benefits from standard monitoring and testing requirements such as monitoring storage liquid levels and testing soils for agricultural nutrients. In some cases, specific concerns may require short-term non-standard monitoring and testing to reassure a farmer and the regulator that a specific water quality concern has not been overlooked.

However, in many Missouri site-specific permits there are extensive groundwater, surface water and soil sampling requirements which also included the requirement to test some samples for up to 30 different parameters. Most of these testing protocols have little environmental monitoring value but add cost to the operation. Monitoring and testing is one area where Missouri clearly has greater regulatory requirements for site-specific permits than the other states considered in this analysis.

Examples of excessive sampling and testing include the requirement of one operator to sample all surface water lakes five times per year and test the samples for a full environmental suite of nutrients and heavy metals. Other permits have required total nitrogen testing of soil samples. Total nitrogen does little to describe the agricultural or environmental status of the soil. Other operations have been required to place monitoring wells around lagoons that have been certified to meet construction standards.

The integrity of the water quality regulatory program is undermined by the arbitrary application of these testing and monitoring requirements to certain types of operations. Missouri farmers would benefit from more specific limits on monitoring and testing requirements in site-specific permits. Such limits would have no impact on water quality but a clear positive impact on business competitiveness.
13. Adoption of the phosphorus rule should focus on strategies that are most likely to improve water quality in impaired watersheds and are the most feasible for farmers. Example strategies include:

- Promote unilateral phosphorus reduction strategies such as improved feed efficiency, erosion reduction practices and improved placement and timing of manure applications.

- Allow phosphorus banking strategies to minimize the time impact of a phosphorus rule and allow most farmers to apply manure as a complete fertilizer in the year of application without needing to invest in new equipment.

This proposal would improve water quality and have a positive or neutral effect on business competitiveness compared to poorly implemented phosphorus strategies (block 1). See chapter 4.4 for further information.

Nutrient management planning is the core strategy to protect water quality from degradation due to land application of manure. The revised USEPA rules for concentrated animal feeding operations (CAFOs) require that all states adopt new standards that require a phosphorus assessment on all fields that receive manure.

Not all strategies for reducing phosphorus loss from agricultural fields are equally effective. There are many misconceptions about how to improve water quality through phosphorus management and there are prominent examples of phosphorus limits being imposed that have little benefit to water quality but have a large negative impact on farm competitiveness.

Both unilateral and transfer strategies can be important components of a program to improve phosphorus management on a farm. Unilateral strategies are particularly desirable because they result in an absolute reduction in the phosphorus losses from agricultural fields. We need to promote unilateral and effective transfer strategies with our regulatory system. These strategies will improve water quality and improve competitiveness compared to poorly conceived phosphorus regulations.
14. Agriculture and regulatory advocates should enter a dialogue on how best to insure that manure sold or given away by an operation is applied in an appropriate manner while facilitating a market for manure.

This proposal would potentially improve water quality and business competitiveness (block 1). See chapter 4.4 for further information.

All parties in the debate on manure management acknowledge the challenge of insuring that manure that is sold or given away by an operation is applied appropriately. Such manure is appropriately no longer covered by the terms of the concentrated animal feeding operation permit except for basic record keeping requirements. Extending regulations to all land receiving manure will depress or eliminate the market for manure. A lack of any controls on this manure will promote permitted operations to divest of land base for manure application and sell or give away all their manure.
15. Missouri plant available nitrogen calculation should be simplified to eliminate tracking of insignificant quantities of nitrogen.

This proposal would likely have no effect on water quality while improving business competitiveness (block 4). See chapter 4.4 for further information.

Missouri has the most complex nitrogen availability calculation of the surveyed states. The current plant available nitrogen (PAN) calculation requires tracking organic nitrogen contributions from manure for three years. Frequently the amount of nitrogen in the third year is less than five to ten pounds. Requiring farmers to track this amount of nitrogen is time consuming, adds complication and gives the general public a false sense of the precision of our nitrogen application strategies. Improving the PAN equation has no impact on water quality while improving competitiveness by simplifying nutrient management and record keeping requirements.
Calculations determining land needs for nutrient management plans in construction permits should be based on tabular values that are equal to the mean plus one standard deviation unless the operation can document that a lower manure nutrient content is anticipated.

This proposal would improve water quality and have a positive or neutral effect on business competitiveness compared to poorly implemented phosphorus strategies (block 1). See chapter 4.4 for further information.

Current planning for land needs for animal feeding operations is based on the mean historic nutrient content of similar operations. This means that many operations (those that have nutrient contents greater than average) will have need more land than anticipated during the planning process. Because planning is done on mean values nearly half the operations will find they need more land than anticipated during the planning process.

Planning should be done on a more conservative estimate of manure nutrient concentration and production. Developing tabular values for planning purposes based on the mean plus one standard deviation will insure that over 80% of operations will have sufficient land set aside through the planning process. Operations that have data from similar operations showing that the tabular values are too high for their site can use lower values with proper documentation.
17. Missouri site-specific permit soil testing requirements should conform to recommended agronomic sampling strategies.

This proposal would improve business competitiveness and have a neutral effect on water quality (block 4). See chapter 4.4 for further information.
18. Review and update the information contained in *Manual 121: Design Guidelines for Animal Waste Management for Concentrated Animal Feeding Operations*, 1989. Although this is a procedural recommendation, it is necessary in order to ensure accurate conveyance of proper design standards for manure storage facilities.

This proposal would improve business competitiveness and water quality (block 1). See chapter 4.2 for further information.
2.2 Recommendations that should improve water quality in Missouri while potentially reducing or having a neutral effect on the competitiveness of Missouri agriculture.

19. Manure storage volume (and length of storage period) should be based on accessibility to land application sites and not on the type or consistency of the manure. Missouri should encourage design of manure storage structures with sufficient volume to promote manure applications that optimize crop utilization of nutrients and reduce nutrient loss potential.

This proposal would likely improve water quality while potentially reducing business competitiveness (block 3). See chapter 4.2.1 for more information.

Manure storage volume must be available when needed for the storage to play its water-protection role. Current manure storage period design criteria in Missouri vary based on the type of manure storage. Instead, storage design criteria should be based on how the storage is managed and the flexibility the farmer has in land accessibility for manure application. Operations that have limited opportunities for manure application require storages with greater storage design periods.

This recommendation will potentially increase water quality by reducing the need for manure applications under marginal conditions. Competition may be hurt because larger storages needed on some operations will have higher initial costs and require more time and expense for manure application.
Missouri should develop recommendations for site selection and structural requirements for dry manure storages.

This proposal would likely improve water quality while potentially reducing business competitiveness (block 3). See chapters 4.2.6.1 and 4.2.6.2 for more information.

<table>
<thead>
<tr>
<th>Water Quality</th>
<th>Competitiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>Neutral</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

Missouri does not currently specify site requirements and structural requirements for dry manure storages in the regulations.

Dry manure storage systems should be designed to prevent losses of manure nutrients to ground and surface waters. Storm water contact with dry or solid manure should be minimized and any storm water that becomes contaminated due to contact with stored dry manure should be treated as a liquid manure stream.

Standards should encourage proper siting of manure storages and the use of covers to prevent storm water from coming into contact with the stored manure. If solid manure storage structures are not covered, the structures should be constructed such that any liquid runoff is collected and managed in a liquid manure system.

Business competitiveness could be affected by higher costs and time requirements of building and maintaining approved structures and contained manures.
Improper lagoon closure has sufficient potential to affect environmental quality so that:

- CAFO operating permits should include lagoon closure plans.
- Missouri should further investigate financial methods to effectively indemnify lagoon closure obligations.
- Lagoon closure plans and indemnification should not be dependent on whether manure is transported to the lagoon with a flushing (liquid) transport system.

This proposal would likely improve water quality while potentially reducing business competitiveness (block 3). See chapter 4.6 for more information.

Proper closure of a manure storage facility is an important water quality objective. For some systems, such as unagitated lagoons, the cost and the water-quality challenges associated with the final cleanout are much greater than the annual costs of operating a lagoon. Many of the nutrients generated by the facility are sequestered in the sludge and accumulate during the lifetime of the manure storage structure. Lagoon closure plans provide a mechanism to help farmers consider how they will manage with the accumulated nutrients.

Closure of manure storage facilities that are fully cleaned annually, such as slurry and litter systems will not incur a large closure expense. Plans and financial security for closure are not as critical for these facilities as for lagoons and earthen manure storages which essentially function as long term nutrient storage.

Missouri requires a closure plan for the largest operations that use flushing (liquid transport of manure) system technology associated with lagoons. These plans have the potential to benefit water quality by educating farmers about the inevitable expenses and logistics of closing their facility.

Developing a closure plan will take time and have a significant cost, particularly for lagoon and earthen manure storage basins. Relevant plans will need to be updated over the life of the structure to keep up with changes in technology and availability of land for the application of the stored manure nutrients over the typical 20-year life of these manure storage and treatment facilities. Alternatively, the initial plan could be structured more as an educational document so the farmer knows the challenges that must be addressed in closing the facility in the future.
22. Indemnity fund costs should be equitably borne by all classes of operations covered by the program.

This proposal would potentially improve water quality and be neutral or negative for business competitiveness (block 2 or 3). See chapter 3.2 and 4.6 for further information.

Indemnity funds protect water quality by insuring sufficient funds are in place to properly close all manure storages. Missouri’s fund charges and refunds fees to only the largest operations (Class IA) using flush systems. Yet the fund is designed to insure that manure storages of all sizes are properly closed.
2.3 State Regulatory Abstracts

Missouri

Animal Background:
Missouri has more than 600 animal feeding operations between 300 to 999 animal units and 400 operations with more than 1,000 animal units according to information provided by Missouri Department of Natural Resources (State Compendium: Programs and Regulatory Activities Related to AFOs, 2002). More recent statistics provided by Missouri Department of Natural Resources indicate there are 368 permitted operations in the state. Swine and poultry operations are the primary permitted operations.

Regulatory Agency:
The Missouri Department of Natural Resources is the regulatory agency that administers and regulates animal feeding operations in the state of Missouri. The National Pollutant Discharge Elimination System (NPDES) permitting program is also administered by the state of Missouri. Site-specific and general permits for concentrated animal feeding operations are being utilized in this program. Operating and construction permits are required for all concentrated animal feeding operations.

Nature of Regulations:
- Most standards and regulatory requirements typically fell within the range of the other states we studied.
- The exception was regulations and requirements affecting the largest operations (Class IA with 7,000 or more animal units). Regulations in this area, in total, were more restrictive than those in any other state considered. Examples include higher fees associated with operating permits ($5,000 annually), extensive reporting requirements and prohibition of certain critical watersheds.
- Missouri has the most extensive network of local restrictions affecting animal feeding operations.
- Regulations were spread out into many different chapters throughout the code of state regulations. It can be difficult to interpret which regulations apply within 10 CSR 20-8 to animal feeding operations.

Missouri rules will require the fewest changes of any of the four states to accommodate the revised USEPA rules for concentrated animal feeding operations. The primary adjustment will be adoption of the phosphorus rule.
Iowa

Animal Background:
Iowa has 3,160 animal feeding operations with 300 to 1,000 animal units and 1,290 animal feeding operations with greater than 1,000 animal units based on the information provided by USDA (State Compendium: Programs and Regulatory Activities Related to AFOs, 2002). Iowa animal agriculture is predominantly swine and beef.

Regulatory Agency:
Iowa Department of Natural Resources (IDNR) is the regulatory agency that administers and regulates confinement feeding operations and open feedlots in the state of Iowa. The state of Iowa has the regulatory power to issue NPDES permits.

Nature of Regulations:
- Iowa had the most detailed and difficult to interpret regulations of all the studied states. Permitting requirements had many conditional requirements where the rules only applied to some operations or that different standards, setbacks or fees applied to different operations based on operation size, type and/or other factors.
- Iowa rules favored open beef feedlots. These operations did not need nutrient management plans, had significantly reduced setbacks and reduced fees. However, open feedlots were required to obtain construction and operating permits if they had 1,000 animal units or more.
- No confinement operations are required to get an operating permit. All confined feeding operations with earthen storages (all sizes) must get a construction permit. Confined feeding operations with all cement and other formed storages need a construction permit if they have 1,000 animal units or more.

In general, Iowa regulations were similar to Missouri’s except for lack of an operating permit for confined operations. Other significant differences were:
- More stringent Missouri regulations for large operations.
- The Iowa requirement for a construction permit for smaller earthen storages.
- The Iowa requirement for nutrient management plans on all confined operations with more than 500 animal units.

We anticipate Iowa will need significantly more substantial changes in their rules to comply with the revised USEPA regulations for concentrated animal feeding operations. In addition to the need to incorporate the phosphorus rule, Iowa will need to put in place a program to issue operating permits.
Indiana

Animal Background:
Indiana has more than 3,000 confined feeding operations (CFO) and about 400 concentrated animal feeding operations (CAFO) based on the information provided by Indiana’s Department of Environmental Management (State Compendium: Programs and Regulatory Activities Related to AFOs, 2002). Indiana animal agriculture is predominantly swine and poultry.

Regulatory Agency:
Indiana’s Department of Environmental Management has the responsibility for administering and regulating these operations and are authorized to issue National Pollutant Discharge Elimination System (NPDES) permits. All CFOs must attain and maintain a CFO approval. Concentrated animal feeding operations must seek a NPDES general or individual operating permit.

Nature of Regulations:
- Indiana typically regulated smaller operations than the other states with the exception of Oklahoma poultry operations.
- Indiana typically had similar or reduced regulatory requirements compared to the other states. In the current climate Indiana was the least regulated state among the four we considered.

Indiana is facing pressure from USEPA to raise its standards for operating permits. Their current standards are being challenged as not meeting federal standards. Indiana will also need to make extensive changes to meet phosphorus limit requirements in the revised USEPA regulations for concentrated animal feeding operations like the other states.
Oklahoma

Animal Background:
Oklahoma has 398 animal feeding operations with 300 to 1,000 animal units and 174 animal feeding operations with greater than 1,000 animal units based on the information provided by USDA (State Compendium: Programs and Regulatory Activities Related to AFOs, 2002). Oklahoma has significant numbers of beef cattle, swine and poultry.

Regulatory Agency:
Oklahoma has a different structure for permitting authority than any of the studied states. The Oklahoma Department of Agriculture, Food and Forestry-Water Quality Division has a concentrated animal feeding operations program that regulates animal feeding operations but the state of Oklahoma does not have concentrated animal feeding operation National Pollutant Discharge Elimination System (NPDES) regulatory authority. The NPDES program is administered by the EPA Region 6 which issues general permits for concentrated animal feeding operations. So essentially, Oklahoma concentrated animal feeding operations have to follow the rules and requirements of both programs.

Nature of Regulations:

- Oklahoma regulations are significantly less strict for cattle. Cattle feedlots are excluded from many setback requirements, state monitoring requirements and state fee requirements.
- Oklahoma is similar to Missouri in having significantly higher requirements for the largest operations.
- Oklahoma setback requirements effectively stopped all growth of large swine operations when they were implemented in 1998.
- Poultry operations of all sizes have state regulatory requirements in Oklahoma.

Oklahoma’s current rules are the old national USEPA standard for concentrated animal feeding operations because Oklahoma’s permitting program is administered by USEPA. Consequently changes to adopt the revised USEPA regulations reflect the changes in the national rules.
Chapter 3:
Fees and Permits

3.1 Who Is Required To Obtain Permits

Recommendation:

Missouri should develop alternative permitting criteria that consider the likelihood of a discharge and the efficiency of nutrient use on the farm. Operations with low potential to discharge and high utilization of nutrients should be rewarded with lower regulatory scrutiny.

Highlights and Impacts:

- Missouri has less stringent requirements for who needs a permit than the other 3 states.
- Some states favor or discriminate against certain animal types or manure storages. For example:
  - Oklahoma requires all poultry operations to register with the Department of Agriculture and submit a nutrient management plan.
  - Iowa requires owners of all earthen manure storages to obtain a construction permit regardless of size.
- All states require a stormwater permit during construction of the facility.
- Indiana is the only state to not require some sort of water certification or water use permit for water use.
- Indiana is the only state to have the “No potential to discharge” designation for CAFOs that would allow an operation to not be required to obtain permits.

Permitting operations has a valid water quality benefit if it focuses regulatory attention on those operations most likely to cause water quality degradation. All states including Missouri primarily use size criteria to determine who needs a permit. There are aspects of the permitting process where size clearly is a good surrogate for water quality vulnerability. The potential impact of a spill from a liquid manure storage clearly increases with the size of the operation. However, the size connection between water quality and land application is less clear.

We propose that criteria be developed that would reward operations that have manure management systems with low or no potential to discharge. Similarly we recommend a system that would reward operations that efficiently use the nutrients entering the farm as feed. Operations that are less efficient could potentially get more environmental regulation than operations that are more efficient, regardless of size. Such a system would benefit water quality by focusing regulatory requirements on those operations where nutrient inputs are out of balance with land resources.
### Table 3.1-1. Who needs a permit?

<table>
<thead>
<tr>
<th>State</th>
<th>Differences from standard EPA rules requiring operating permits¹</th>
<th>Stormwater permit</th>
<th>Water permit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>• Dry litter operations regulated under CAFO rule and subject to its requirements.</td>
<td>Required with 1 or more acres of land disturbance</td>
<td>The Division of Geology and Land Survey approves all wells pumping more than 70 gallons per minute.</td>
</tr>
</tbody>
</table>
| Iowa       | • All unformed (earthen) manure storage structure or egg washwater storage structure, regardless of size, are required to obtain a construction permit.  
• Only open feedlots require operating permits unless the operation is designated by IDNR. | Required when construction will disturb 1 or more acres                       | Required if the facility will withdraw more than 25,000 gallons per day        |
| Indiana    | • Confinement operations with more than 300 cattle, or 600 swine or sheep, or 30,000 fowl, such as chickens, ducks and other poultry must maintain an CFO approval through IDEM.  
• No potential to discharge designation is available to Large CAFOs | Required when construction will disturb 1 or more acres                       | No                                                                           |
| Oklahoma   | • All poultry operations must register with OK Dept of Agriculture prior to construction. | Required when grading, excavation, or clearing disturb more than 1 acre       | AFOs must obtain a groundwater permit to use groundwater.                     |

¹ Standard EPA rules require permits on operations greater than or equal to 1000 animal units or on operations greater than or equal to 300 animal units that discharge effluent directly into waters of the state, or through a manmade conveyance into waters of the state, or where waters of the state originate outside the operation and pass over, across or through the operation or otherwise come into direct contact with the animals confined in the operation.

### Table 3.1-2. Operation sizes where size alone is the criteria for imposing a regulation on an operation.

<table>
<thead>
<tr>
<th>State</th>
<th>Use Mixed Animal Calculations</th>
<th>Minimum operation size where size alone determines a regulatory requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cattle</td>
</tr>
<tr>
<td>Missouri</td>
<td>Yes</td>
<td>1000</td>
</tr>
<tr>
<td>Iowa - Open feedlot</td>
<td>Yes</td>
<td>1000</td>
</tr>
<tr>
<td>Iowa - Formed manure storage</td>
<td>Yes</td>
<td>500</td>
</tr>
<tr>
<td>Iowa - Unformed manure storage</td>
<td>Yes</td>
<td>0</td>
</tr>
<tr>
<td>Indiana</td>
<td>No</td>
<td>300</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>No</td>
<td>1000</td>
</tr>
</tbody>
</table>

35
Appendix 3.1: State-by-state summary

Missouri

Sources: 10 CSR 20-6.300(1), 10 CSR 20-6.200(1)(B)7, 10 CSR 20-2.010

In the state of Missouri, concentrated animal feeding operations (CAFO) are required to obtain construction and operating permits. A CAFO can be defined as an operating location where animals have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period, and a ground cover of vegetation is not sustained over at least 50% of the animal confinement area and meets one of the following conditions:

- Class I operation (≥ 1000 animal units); or
- Class II operation (≥ 300 animal units) and discharges through a man-made conveyance or where pollutants are discharged directly into waters of the state which originate outside of and pass over, across or through the operation or otherwise come into direct contact with the animals confined in the operation.

The following classes of animal feeding operations are used in Missouri to determine the size of operations.

- Class IA – Any CAFO with a capacity of 7,000 animal units or more.
- Class IB – Any CAFO with a capacity between 3,000 to 6,999 animal units.
- Class IC – Any CAFO with a capacity between 1,000 to 2,999 animal units.
- Class II – Any CAFO with a capacity between 300 to 999 animal units.

Conversions to determine how many animal units for a specific animal feeding operation are labeled in the following table.

Table 3.1-3. Animal type and number of animals equal to one animal unit in Missouri.

<table>
<thead>
<tr>
<th>One animal unit =</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Beef feeder or slaughter animal</td>
</tr>
<tr>
<td>0.5</td>
<td>Horse</td>
</tr>
<tr>
<td>0.7</td>
<td>Dairy Cow</td>
</tr>
<tr>
<td>2.5</td>
<td>Swine weighing over 55 lbs.</td>
</tr>
<tr>
<td>15</td>
<td>Swine weighing less than 55 lbs.</td>
</tr>
<tr>
<td>10</td>
<td>Sheep</td>
</tr>
<tr>
<td>30</td>
<td>Chicken laying hens</td>
</tr>
<tr>
<td>60</td>
<td>Chicken layer pullets</td>
</tr>
<tr>
<td>55</td>
<td>Turkeys</td>
</tr>
<tr>
<td>100</td>
<td>Broiler Chickens</td>
</tr>
</tbody>
</table>

With these animal class categories, Missouri animal feeding operations will fall into the following classifications.
Table 3.1-4. Missouri animal unit and size classifications

<table>
<thead>
<tr>
<th>Animal Class</th>
<th>Class IA 7,000 AUs</th>
<th>Class IB 3,000 to 6,999 AUs</th>
<th>Class IC 1,000 to 2,999 AUs</th>
<th>Class II 300 to 999 AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef feeder or slaughter animal</td>
<td>7,000</td>
<td>3,000 to 6,999</td>
<td>1,000 to 2,999</td>
<td>300 to 999</td>
</tr>
<tr>
<td>Horse</td>
<td>3,500</td>
<td>1,500 to 3,499</td>
<td>500 to 1,499</td>
<td>150 to 499</td>
</tr>
<tr>
<td>Dairy Cow</td>
<td>4,900</td>
<td>2,100 to 4,899</td>
<td>700 to 2,099</td>
<td>200 to 699</td>
</tr>
<tr>
<td>Swine (≥ 55 lbs.)</td>
<td>17,500</td>
<td>7,500 to 17,499</td>
<td>2,500 to 7,499</td>
<td>750 to 2,499</td>
</tr>
<tr>
<td>Swine (&lt; 55 lbs.)</td>
<td>105,000</td>
<td>45,000 to 104,999</td>
<td>15,000 to 44,999</td>
<td>4,500 to 14,999</td>
</tr>
<tr>
<td>Sheep</td>
<td>70,000</td>
<td>30,000 to 69,999</td>
<td>10,000 to 29,999</td>
<td>3,000 to 9,999</td>
</tr>
<tr>
<td>Chicken laying hens</td>
<td>210,000</td>
<td>90,000 to 209,999</td>
<td>30,000 to 89,999</td>
<td>9,000 to 29,999</td>
</tr>
<tr>
<td>Chicken layer pullets</td>
<td>420,000</td>
<td>180,000 to 419,999</td>
<td>60,000 to 179,999</td>
<td>18,000 to 59,999</td>
</tr>
<tr>
<td>Turkeys</td>
<td>385,000</td>
<td>165,000 to 384,999</td>
<td>55,000 to 164,999</td>
<td>16,500 to 54,999</td>
</tr>
<tr>
<td>Broiler chickens</td>
<td>700,000</td>
<td>300,000 to 699,999</td>
<td>100,000 to 299,999</td>
<td>30,000 to 99,999</td>
</tr>
</tbody>
</table>

Only Class I CAFOs that disturb one acre or more are required to get land disturbance/stormwater permits. All wells that pump more than 70 gallons per minute must be approved by the Division of Geology and Land Survey.

Iowa

Sources: IC 459.303, IAC 567-65.9(1), IAC 567-65.7, IAC 567-64.13, IAC 567-49.7 (3), IAC 567-65.4, IAC 567-65.1, IDNR Confined Feeding Operation Application Form

Open feedlots and confinement feeding operations are regulated differently in the state of Iowa. To figure out the animal unit capacity that would apply to either type of operation, Iowa uses the Table 3.1-5 Animal unit conversion chart below.

Table 3.1-5. Animal unit (AU) conversion chart. Number of animals multiplied by the factor below.

<table>
<thead>
<tr>
<th>Animal Class</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slaughter and feeder cattle</td>
<td>1.0</td>
</tr>
<tr>
<td>Mature dairy cattle</td>
<td>1.4</td>
</tr>
<tr>
<td>Immature dairy cattle</td>
<td>1.0</td>
</tr>
<tr>
<td>Swine over 55 lbs.</td>
<td>0.4</td>
</tr>
<tr>
<td>Swine 15 lbs. to 55 lbs.</td>
<td>0.1</td>
</tr>
<tr>
<td>Sheep and Lambs</td>
<td>0.1</td>
</tr>
<tr>
<td>Horses</td>
<td>2.0</td>
</tr>
<tr>
<td>Turkeys 7 lbs. or more</td>
<td>0.018</td>
</tr>
<tr>
<td>Turkeys less than 7 lbs.</td>
<td>0.0085</td>
</tr>
<tr>
<td>Broiler or layer chickens 3 lbs.</td>
<td>0.01</td>
</tr>
<tr>
<td>Broiler or layer chickens &lt; 3 lbs.</td>
<td>0.0025</td>
</tr>
</tbody>
</table>
A confinement feeding operation (CFO) can be defined as an animal feeding operation in which animals are confined to areas, which are totally roofed. A CFO that meets any of the following criteria must seek and obtain a construction permit.

- Construction or expansion of an unformed manure storage structure regardless of size.
- Construction or expansion of a confinement building that uses an unformed manure storage structure regardless of size of operation.
- Construction or expansion of a formed manure storage structure if after construction or expansion is 1,000 AU or more.
- Construction or expansion of a confinement building that uses a formed manure storage structure if after construction or expansion is 1,000 AU or more.
- Confinement feeding operation includes an egg washwater storage structure regardless of size.
- Reopening a confinement feeding operation that was closed for 24 months or more if operation uses an unformed manure storage structure or if the operation uses a formed manure storage structure and is 1,000 AU or more.

An operation permit for a confinement feeding operation is only required if the animal capacity exceeds 300 AU; and manure from the operation is discharged into a water of the state through a human-made manure drainage system or is discharged directly into a water of the state which originates outside of and traverses the operation.

An open feedlot that has an animal capacity exceeding 1,000 AU; or has an animal capacity exceeding 300 AU and manure from the operation is discharged into a water of the state through a human-made manure drainage system or is discharged directly into a water of the state which originates outside of and traverses the operation is required to obtain a construction and operating permit.

Animal feeding operations planning construction activities must obtain a stormwater construction permit if the construction will disturb one or more acres. A water withdrawal permit is required if the facility will withdraw more than 25,000 gallons per day.

Indiana


A confined feeding operation (CFO) in the state of Indiana is required to obtain and maintain CFO approval. A CFO is an animal feeding operation where animals are confined for 45 days or more in a year, the confinement area is covered with less than 50% vegetation and number of animals exceed 300 cattle, 600 swine, 600 sheep or 30,000 fowl.

An operation that meets the definition of a concentrated animal feeding operation (CAFO) must obtain a NPDES general or individual permit. The definition of a CAFO
is the EPA definition of a large CAFO; or a medium CAFO that 1) pollutants are discharged into the waters of the state through a manmade ditch, flushing system or other similar manmade device or 2) pollutants are discharged directly into the waters of the state that originate outside of and pass over, across or through the facility or otherwise come into direct contact with the animals confined in the operation. The animal numbers used per species is listed in Table 3.1-6. The application for a CFO approval constitutes a notice of intent (NOI) for a NPDES general or individual permit. A CAFO that has a general permit is not required to renew a CFO approval. Construction shall not begin on a confinement building or waste management system at a new or existing CFO or CAFO without obtaining the prior written approval of the commissioner.

Table 3.1-6. Indiana definitions of large and medium CAFOs

<table>
<thead>
<tr>
<th>Large CAFO</th>
<th>Medium CAFO</th>
<th>Animal Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater than 699</td>
<td>200 to 699</td>
<td>Mature dairy cows</td>
</tr>
<tr>
<td>Greater than 999</td>
<td>300 to 999</td>
<td>Veal calves</td>
</tr>
<tr>
<td>Greater than 999</td>
<td>300 to 999</td>
<td>Cattle other than mature dairy cows or veal calves</td>
</tr>
<tr>
<td>Greater than 2,499</td>
<td>750 to 2,499</td>
<td>Swine greater than 55 lbs.</td>
</tr>
<tr>
<td>Greater than 9,999</td>
<td>3,000 to 9,999</td>
<td>Swine less than 55 lbs.</td>
</tr>
<tr>
<td>Greater than 499</td>
<td>150 to 499</td>
<td>Horses</td>
</tr>
<tr>
<td>Greater than 9,999</td>
<td>3,000 to 9,999</td>
<td>Sheep or lambs</td>
</tr>
<tr>
<td>Greater than 54,999</td>
<td>16,500 to 54,999</td>
<td>Turkeys</td>
</tr>
<tr>
<td>Greater than 29,999</td>
<td>9,000 to 29,999</td>
<td>Laying hens or broilers (liquid manure system)</td>
</tr>
<tr>
<td>Greater than 124,999</td>
<td>37,500 to 124,999</td>
<td>Chickens other than laying hens (non-liquid manure system)</td>
</tr>
<tr>
<td>Greater than 81,999</td>
<td>25,000 to 81,999</td>
<td>Laying hens (non-liquid manure system)</td>
</tr>
</tbody>
</table>

*Medium CAFOs must meet one of the following conditions:
- Pollutants are discharged into waters of the state through a manmade ditch, flushing system, or similar manmade device or
- Pollutants are discharge directly into waters of the state that originate outside of and pass over, across, or through the facility or otherwise come into direct contact with the animals confined in the operation.

The "No potential to discharge" designation is allowed for owner/operators of Large CAFOs. The owner/operator must apply and receive a notification from the commissioner of a determination that the CAFO has no potential to discharge in order to not be required to seek permit coverage.

There are also requirements for stormwater permits if the disturbance is greater than one acre with construction activity. There is no water use/withdrawal permit that would apply to livestock operations in Indiana.

Oklahoma

*Sources: OAC 35:17-5-3(a), OAC 35:17-3-5, OAC 35:17-3-30, 2 O.S. 9-202, OAC 252:605-1-5(b)(3)(L), OAC 785:30-1-4(a)*

Oklahoma is a unique state, whereas the state has not been authorized as the permitting authority to implement the NPDES CAFO program. The Region 6 EPA
Office administers the CAFO program so the federal rule and regulations apply to animal feeding operations in the state of Oklahoma. But Oklahoma also has a separate state program that enforces rules and regulations to livestock operations. Oklahoma requires CAFO operations to apply for a CAFO license to operate in the state.

The Oklahoma CAFO license is required for all CAFOs, any person that has filed a notice of intent to be covered under NPDES general permit issued by EPA, any animal feeding operation possessing a NPDES permit or any animal feeding operation designated as a significant contributor of pollution by OK Dept of Agriculture or director of USEPA.

A CAFO can be defined as any one of the following definitions.

- Licensed managed feeding operation is an animal feeding operation which is primarily liquid waste system where animals are primarily housed in a roof-covered structure and have more than:
  1. 2,500 swine over 55 lbs.;
  2. 10,000 weaned swine under 55 lbs.;
  3. 100,000 laying hens or broilers, if the facility has continuous overflow watering;
  4. 30,000 laying hens or broilers, if the facility has a liquid manure system; or
  5. Any combination of swine greater or less than 55 lbs. that would equal 1,000 animal units.

- An animal feeding operation with greater than 1000 slaughter and feeder cattle, 700 mature dairy cattle, 500 horses, 10,000 sheep of lambs, 55,000 turkeys or 1000 animal units and allows pollutants to be discharged into the waters of the state.

- An animal feeding operations with greater than 300 slaughter or feeder cattle, 200 mature dairy cattle, 750 swine over 55 lbs., 3,000 swine under 55 lbs., 150 horses, 3,000 sheep or lambs, 16,500 turkeys, 30,000 laying hens or broilers (if the facility has continuous overflow watering), 9,000 laying hens or broilers (liquid manure system) or 300 animal units; and one of the following conditions is met:
  - Pollutants are discharged into waters of the state through an artificially constructed ditch, flushing system or other similar artificially constructed device; or
  - Pollutants are discharged directly into navigable waters, which originate outside of and pass over, across or through the facility or otherwise come into direct contact with the animals confined in the operation.

- Designated by the Oklahoma Department of Agriculture as a significant contributor to pollution of state water

Oklahoma has adopted federal NPDES requirements for stormwater permits. Any AFO project that includes grading, excavation, or clearing and will disturb more than one acre require the need for a stormwater construction permit.

Any person intending to initiate a use of groundwater for beneficial use as other than domestic use shall make an application and obtain a groundwater permit before completing any fresh water well for such purposes.
3.2 Construction and Operating Permit Fees

Recommendations:

- Missouri should consider reducing site-specific permit fees to encourage adoption of innovative technologies by smaller operations and to align site-specific fees with competing states.

- Indemnity fund costs should be equitably borne by all classes of operations covered by the program.

Highlights and Impacts:

- Missouri fees are similar to or less than competing states for unpermitted or operations obtaining a general permit.
- Although Missouri site-specific fees reflect the higher costs associated with managing these permits, these fees are substantially greater in Missouri than in other states except Oklahoma.
- Indemnity funds to address abandoned lagoons are in place in Missouri and Iowa.
- Indemnity funds tend to inequitably distribute their costs. Iowa collects indemnity fees as part of the construction permit fees imposing the costs on some operations that will never be built. Missouri’s indemnity pool is available for all operations but only Class IA operations contribute to the fund.

Fees typically are charged to provide cost recovery for regulatory activities. There is potential for punitive use of permit fees through inequitable fee structures. There is also potential for fees to reduce water quality if they discourage changes by an operation that would improve water quality.

Missouri operations that adopt innovative technologies for manure management would likely be required to obtain a site-specific permit. Permit fees are substantially higher for the site-specific permit compared to the general permit. For example, annual fees are $5,000 for a site-specific permit whereas general permit fees are $150 for five years. This differential in permitting costs could reasonably be considered a disincentive to smaller operations considering innovative technologies.

Higher site-specific permit fees compared to general permit fees in Missouri reflect the higher costs to Missouri Department of Natural Resources associated with managing these permits. However, these fees are substantially greater in Missouri than in Iowa and Indiana. This suggests that other states spend less money managing site-specific permits or hold permit fees below cost.

Indemnity funds provide a means to insure manure storages are appropriately emptied and closed, an activity that has clear water quality benefits.
Table 3.2-1. Summary of permit fees.

<table>
<thead>
<tr>
<th>State</th>
<th>Who needs a construction permit?</th>
<th>Are annual fees for permits and licenses affected by operation size?</th>
<th>Other fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>Class I operations (≥1000 animal units)</td>
<td>Yes, annual fee of $5,000 for site-specific permits (typically only Class IA operations)</td>
<td>Storm water permit (for construction); Indemnity fund (Class IA with automatic flush system only); Operator’s license (Class IA only); Well certification</td>
</tr>
<tr>
<td>Indiana</td>
<td>Operations with more than 300 cattle, 600 swine or sheep or 30,000 chickens in covered confinement</td>
<td>No</td>
<td>Storm water permit; Permit modification fee</td>
</tr>
<tr>
<td>Iowa</td>
<td>Any operation with an earthen manure structure and a formed manure structure (e.g. cement tank) on an operation with ≥1,000 animal units</td>
<td>Yes, manure management compliance fee based on animal units for operations ≥500 animal units.</td>
<td>Storm water permit; Indemnity fund; Water permit; Applicator’s license</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>No construction permitting fees</td>
<td>Yes, licensed managed feeding operations (≥1000 animal units) pay an annual fee based on animal unit</td>
<td>Water fees</td>
</tr>
</tbody>
</table>
Table 3.2-2. Comparison of state start-up fees for a typical swine finisher operation using an earthen manure storage facility. Fees include construction permits, storm water permits, indemnity funds (when charged as part of construction permit fees) and operating permits. (excludes operator certification and water permits)

<table>
<thead>
<tr>
<th>Operation Size</th>
<th>Missouri</th>
<th>Iowa</th>
<th>Indiana</th>
<th>Oklahoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 AU (625 pigs)</td>
<td>$300</td>
<td>$425</td>
<td>$250</td>
<td>$38</td>
</tr>
<tr>
<td>1,000 AU (2,500 pigs)</td>
<td>$1,200</td>
<td>$800</td>
<td>$250</td>
<td>$875</td>
</tr>
<tr>
<td>3,000 AU (7,500 pigs)</td>
<td>$1,200</td>
<td>$1,250</td>
<td>$250</td>
<td>$2,475</td>
</tr>
<tr>
<td>7,000 AU (17,500 pigs)</td>
<td>$6,050</td>
<td>$2,050</td>
<td>$250</td>
<td>$5,750</td>
</tr>
</tbody>
</table>

1 Missouri fees for operations 1,000 to 6,999 animal units can be higher under the unlikely scenario that they obtain a site-specific permit.

Table 3.2-3. Comparison of annual state operating fees for a typical swine finisher operation using an earthen manure storage. (excludes operator certification)

<table>
<thead>
<tr>
<th>Operation Size</th>
<th>Missouri</th>
<th>Iowa</th>
<th>Indiana</th>
<th>Oklahoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 AU (625 pigs)</td>
<td>$0</td>
<td>$0</td>
<td>$20</td>
<td>$38</td>
</tr>
<tr>
<td>1,000 AU (2,500 pigs)</td>
<td>$30</td>
<td>$150</td>
<td>$10</td>
<td>$875</td>
</tr>
<tr>
<td>3,000 AU (7,500 pigs)</td>
<td>$30</td>
<td>$450</td>
<td>$10</td>
<td>$2,475</td>
</tr>
<tr>
<td>7,000 AU (17,500 pigs)</td>
<td>$5,700</td>
<td>$1,050</td>
<td>$10</td>
<td>$5,750</td>
</tr>
</tbody>
</table>

1 Missouri fees for operations 1,000 to 6,999 animal units can be higher under the unlikely scenario that they obtain a site-specific permit.
2 General permit ($150) covers the operation for a 5 year term.
3 Class IA operations must pay $.10 per AU indemnity fee for a 10-year period.
4 Any medium or large CAFO that requires an individual NPDES permit will be required to pay an annual fee of $400 in addition to the $50 application fee that covers the operation for 5 years.
5 CFO Approval ($100) is good for 5 years.
## Appendix 3.2: State-by-state summary

### Missouri

*Sources: RSMO 644.052, RSMO 644.053, RSMO 640.745, 10 CSR 23-2.010(2)*

Table 3.2-4. Fees associated with permitting an animal feeding operation in Missouri.

<table>
<thead>
<tr>
<th>Fee Category</th>
<th>&lt;1,000 AU</th>
<th>1,000 to 6,999 AU</th>
<th>≥ 7,000 AU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction fees</td>
<td>Storm water permits(^2) $300</td>
<td>Application fee $750</td>
<td>Application fee $750</td>
</tr>
<tr>
<td></td>
<td>Storm water permits(^2) $300</td>
<td>Storm water permit(^2) $300</td>
<td>Storm water permit(^2) $300</td>
</tr>
<tr>
<td>Annual fees</td>
<td>None</td>
<td>None</td>
<td>Site-specific operating permit $5,000</td>
</tr>
<tr>
<td>Other fees</td>
<td>Well certification(^5) $35</td>
<td>General operating permit (5-year) $150</td>
<td>Indemnity funds(^3) $700</td>
</tr>
<tr>
<td></td>
<td>Well certification(^5) $35</td>
<td>Well certification(^5) $35</td>
<td></td>
</tr>
</tbody>
</table>

**Total Possible Start-up Permit Fees**

- $335
- $1235
- ≥ $6830

---

1. Higher fees would apply if the operation is permitted.
2. Required when land disturbance exceeds 1 acre.
3. For flush systems only. Paid annually for 10 years, $0.10 per animal unit. Refundable after successful closure of operation.
4. Paid every 3 years for each employee managing manure.
5. One time fee for well that exceed 70 gallons per minute.
### Table 3.2-5. Fees associated with permitting an animal feeding operation in Iowa: unformed manure (earthen) or egg washwater structure

<table>
<thead>
<tr>
<th>Fee category</th>
<th>&lt; 500 AU</th>
<th>&gt;500 AU</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Fees</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Application Fee</td>
<td>$250</td>
<td></td>
</tr>
<tr>
<td>Storm water permits¹</td>
<td>$150</td>
<td></td>
</tr>
<tr>
<td>Indemnity fund</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poultry: ($0.04/AU)</td>
<td>$0 to $20</td>
<td></td>
</tr>
<tr>
<td>Other: ($0.10/AU)</td>
<td>$0 to $50</td>
<td></td>
</tr>
<tr>
<td>Water permit² (10 yr)</td>
<td>$25</td>
<td></td>
</tr>
<tr>
<td>Storm water permits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poultry: &lt;1000 AU</td>
<td>($0.04/AU) $20 to $40</td>
<td></td>
</tr>
<tr>
<td>1000-2999 AU</td>
<td>($0.06/AU) $60 to $180</td>
<td></td>
</tr>
<tr>
<td>&gt;3000 AU</td>
<td>($0.08/AU) &gt;$240</td>
<td></td>
</tr>
<tr>
<td>Other: &lt;1000 AU</td>
<td>($0.10/AU) 0 to $100</td>
<td></td>
</tr>
<tr>
<td>1000-2999 AU</td>
<td>($0.15/AU) $150 to $450</td>
<td></td>
</tr>
<tr>
<td>&gt;3000 AU</td>
<td>($0.20/AU) &gt;$600</td>
<td></td>
</tr>
<tr>
<td>Water permit² (10 yr.)</td>
<td>$25</td>
<td></td>
</tr>
<tr>
<td><strong>Annual Fees</strong></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td><strong>Operator Certification</strong></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td><strong>Provisional</strong></td>
<td>Commercial Applicators License (Annual fee)</td>
<td>$200</td>
</tr>
</tbody>
</table>

### Table 3.2-6. Fees associated with permitting an animal feeding operation in Iowa: formed manure structure (cement, metal or glass-lined)

<table>
<thead>
<tr>
<th>Fee category</th>
<th>&lt; 500 AU</th>
<th>&gt;500 AU</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Fees</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storm water permits¹</td>
<td>$150</td>
<td></td>
</tr>
<tr>
<td>Water permit² (10 yr)</td>
<td>$25</td>
<td></td>
</tr>
<tr>
<td>Storm water permits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poultry: &lt;1000 AU</td>
<td>($0.04 or $0.10/AU) $0 to $100</td>
<td></td>
</tr>
<tr>
<td>1000-2999 AU</td>
<td>($0.08/AU) $60 to $180</td>
<td></td>
</tr>
<tr>
<td>&gt;3000 AU</td>
<td>($0.08/AU) &gt;$240</td>
<td></td>
</tr>
<tr>
<td>Other: &lt;1000 AU</td>
<td>($0.10/AU) 0 to $100</td>
<td></td>
</tr>
<tr>
<td>1000-2999 AU</td>
<td>($0.15/AU) $150 to $450</td>
<td></td>
</tr>
<tr>
<td>&gt;3000 AU</td>
<td>($0.20/AU) &gt;$600</td>
<td></td>
</tr>
<tr>
<td>Water permit² (10 yr.)</td>
<td>$25</td>
<td></td>
</tr>
<tr>
<td><strong>Annual fees</strong></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td><strong>Operator Certification</strong></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td><strong>Provisional</strong></td>
<td>Commercial Manure Service</td>
<td>$225</td>
</tr>
<tr>
<td>Commercial Representative²</td>
<td>$100</td>
<td></td>
</tr>
</tbody>
</table>
Table 3.2-7. Fees associated with permitting an animal feeding operation in Iowa: Open feedlot.

<table>
<thead>
<tr>
<th>Fee category</th>
<th>&lt; 500 AU</th>
<th>&gt; 500 AU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction fees</td>
<td>Stormwater permits¹</td>
<td>$150</td>
</tr>
<tr>
<td>Annual fees</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Operator Certification</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Provisional</td>
<td>Commercial Manure Service⁴</td>
<td>$225</td>
</tr>
<tr>
<td></td>
<td>Commercial Representative⁵</td>
<td>$100</td>
</tr>
</tbody>
</table>

¹ Required on any operation when ground disturbance exceeds 1 acre. $150 is good for 1 year, $300 for 3 years, $450 for 4 years, or $600 for 5 years.
² Fee for well withdrawal of more than 25,000 gallons of water per day. Paid every 10 years.
³ Paid every 3 years for each employee managing manure.
⁴ For a business who charges fees for applying manure on another person’s land (annual fee).
⁵ Manager or employee of a commercial service that is engaged in handling or applying manure for the commercial service (annual fee).

Table 3.2-8. Fees associated with permitting an animal feeding operation in Indiana

<table>
<thead>
<tr>
<th>Fee Category</th>
<th>Type of Permit</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction fees</td>
<td>CFO Approval (5-year term)¹</td>
<td>$100</td>
</tr>
<tr>
<td></td>
<td>Stormwater Permit²</td>
<td>$100</td>
</tr>
<tr>
<td>Annual fees</td>
<td>Individual Operating Permit³</td>
<td>$400</td>
</tr>
<tr>
<td>Other fees</td>
<td>General or Individual Operating Permit⁴ (5 year term)</td>
<td>$50⁵</td>
</tr>
<tr>
<td></td>
<td>Modification of Operating Permit</td>
<td>$50</td>
</tr>
<tr>
<td></td>
<td>Renewal of Operating Permit</td>
<td>$50</td>
</tr>
</tbody>
</table>

¹ Construction Approval is only needed if operation meets the definition of a confined feeding operation (confined 45 days or more in year, confinement area less than 50% vegetation and the number of animals exceeds any of the following levels: 300 cattle, 600 swine, 600 sheep or 3,000 fowl). This approval must be renewed every 5 years.
² Only required if the construction activities disturb 1 acre or more
³ Only required if operation must seek an individual operating permit instead of a general operating permit.
⁴ Not required if operation meets the “no potential to discharge” designation. Also, if operation is required to obtain general permit, a construction approval does not need to be maintained. If operation size is the definition of a Large CAFO or a Medium CAFO that discharges into the waters of the state, then operation is required to have either a general or individual operating permit.
⁵ Only required if construction fees are charged.
### Oklahoma

*Source: 2 O.S. 9-209, 2 O.S. 9-209.1, and 2 O.S. 10-9.8*

#### Table 3.2-9. Fees associated with permitting an animal feeding operation in Oklahoma

<table>
<thead>
<tr>
<th>Fee Category</th>
<th>&lt;1,000 AU</th>
<th>&gt;1,000 AU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Fees</td>
<td>CAFO License&lt;sup&gt;3&lt;/sup&gt;</td>
<td>CAFO License&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>≤ 250 AU</td>
<td>501-3,000 AU</td>
</tr>
<tr>
<td></td>
<td>$15</td>
<td>$75</td>
</tr>
<tr>
<td></td>
<td>251-500 AU</td>
<td>3001-10,000 AU</td>
</tr>
<tr>
<td></td>
<td>$37.50</td>
<td>$150</td>
</tr>
<tr>
<td></td>
<td>501-3,000 AU</td>
<td>&gt;10,000 AU</td>
</tr>
<tr>
<td></td>
<td>$75</td>
<td>$225</td>
</tr>
<tr>
<td></td>
<td>LMFO License&lt;sup&gt;5&lt;/sup&gt;</td>
<td>LMFO License&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>≤ 250 AU</td>
<td>≤ 250 AU</td>
</tr>
<tr>
<td></td>
<td>$0.80 per AU</td>
<td>$0.80 per AU</td>
</tr>
<tr>
<td></td>
<td>501-3,000 AU</td>
<td>&gt;10,000 AU</td>
</tr>
<tr>
<td></td>
<td>$10</td>
<td>$10</td>
</tr>
</tbody>
</table>

**Other Fees**

**Financial Ability Requirements** for closure of retention structures and other waste facilities<sup>2</sup>

- Must have either Category A or B
- **Category A** - financial state listing assets and liabilities with net worth of not less than $10,000 for 300-1000 animal units
- **Category B** is required only if AFO has outstanding citations or fines. The amount greater than $25,000, but not to exceed $5 times the number of animal units for the facility being licensed

**Groundwater Permit**<sup>7</sup> $125 to $2,000

**Operator Certification**

- Private Applicator: $15<sup>1</sup>
- Poultry Commercial Applicator: $15

**Provisional**

- Private Applicator: $15<sup>1</sup>
- Poultry Commercial Applicator: $15

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<sup>1</sup> Private applicator fee can be waived if the poultry operation is registered.

<sup>2</sup> Required for any person who is licensed to operate an animal feeding operation with liquid waste management system.

<sup>3</sup> These fees are for the initial CAFO license and must be paid annually.

<sup>4</sup> Must meet the definition of a licensed managed feeding operation (LMFO- defined as an AFO with wet handling system that is primarily roof covered and 1) 2,500 swine >55 lbs. 2) 10,000 swine <55 lbs. 3) 100,000 laying hens or broilers, if the facility has continuous overflow watering 4) 30,000 laying hens or broilers, if the facility has a liquid manure system 5) any combination of swine weighing over 55 lbs. or under 55 lbs. which would equal 1,000 animal units.)

<sup>5</sup> Must pay an additional $0.80 per AU with the initial application and must be paid annually.

<sup>6</sup> Poultry producer who does not have a CAFO license must pay a $10 annual registration fee regardless of size.

<sup>7</sup> Groundwater application fee is based on amount of acre-feet requested for the withdrawal of groundwater.
3.3 Time Needed for Permits

Business competitiveness is negatively affected by a permitting process that has no time limits. Operators are sensitive to unanticipated or undefined delays prior to and during construction, and prior to startup of operation. Possible permit delays interfere with necessary contracts with construction crews and animal suppliers.

A complicated permitting process and lack of time constraints discourage attraction of businesses. For investors, the ability to plan with certainty is an important consideration in choosing when and where to invest. The state benefits from the economic growth and job creation of efficient businesses.

**Recommendations:**

- All steps of the permitting process have clear, meaningful maximum time requirements allowing an operator to efficiently plan construction projects and animal procurement.

- Operating permits should be issued with construction permits, contingent on certification that the facility was built to permit specifications.

**Highlights and Impacts:**

- Oklahoma has the most complicated and detailed process for obtaining construction and operating permits.
- All states except Iowa’s open feedlots have some sort of neighbor/county notification.
- Iowa has the shortest time period for obtaining a construction permit. Furthermore, Iowa has no requirement for an operating permit for confinement feeding operations.
- Missouri, Iowa and Indiana all have time limits for a decision on a construction permit. In Missouri, the only penalty to the regulatory agency for not meeting the time requirement is loss of permit application fees.
Table 3.3-1. Time requirements associated with various sections of the permitting process

<table>
<thead>
<tr>
<th>State</th>
<th>Neighbor Notification</th>
<th>Construction Permits</th>
<th>Operating Permits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Missouri - Class I CAFO</strong></td>
<td>Property owners with 1.5 times buffer distance, DNR &amp; County board</td>
<td>DNR shall issue or deny construction permit within 60-180 days of the department's receipt of an application.</td>
<td>DNR will approve/deny within 60 days of receipt of the application.</td>
</tr>
<tr>
<td></td>
<td>DNR requires proof of notification upon accepting a construction permit. Notice is valid for 1 year</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Iowa - CFO</strong></td>
<td>County board of supervisors</td>
<td>Make a determination regarding the approval or denial of permit within 60 days after they receive a complete application.</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Prior to construction permit application. County must submit proof of public notice to IDNR within 30 days.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Iowa - Open Feedlot</strong></td>
<td>None</td>
<td>Shall apply at least 90 days before construction</td>
<td>Shall apply for an operation permit at least 180 days prior to the date operation is scheduled.</td>
</tr>
<tr>
<td><strong>Indiana - CFO</strong></td>
<td>Adjoining property owners/residences &amp; county commissioners</td>
<td>Review the application, make any additional requests and notify the facility with decision within 90 days of the receipt of the Notice of Intent.</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Notification within 10 working days of filing an application for CFO approval. Public hearing &amp; comment period of 30 days may be required.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Indiana - CAFO</strong></td>
<td>IDEM, adjoining property owners/residences, newspaper public notice, &amp; county commissioners</td>
<td>Review the application, make any additional requests and notify the facility with decision within 90 days of the receipt of the Notice of Intent.</td>
<td>Review the application, make any additional requests and notify the facility with decision within 90 days of the receipt of the NOI.</td>
</tr>
<tr>
<td></td>
<td>Submit a Notice of Intent to IDEM at least 180 days before the date is populated with animals. Public hearing &amp; comment period of 30 days may be required.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Oklahoma - CAFO</strong></td>
<td>Affected property owners and one local newspaper’s legal notices</td>
<td>Public review period is 20 days. If affected property owners request a hearing, it can delay the decision another 90 days.</td>
<td>CAFO License: 60-90 days for review. Must have completed all comment and notification requirements.</td>
</tr>
<tr>
<td></td>
<td>Public review period is 20 days.</td>
<td>Must have a building permit issued by OK Board of Ag. The Board issues a building permit after the public review/hearing process. No maximum time limits are specified.</td>
<td>NPDES permit: 180 days prior to startup if you are a new facility or before your present NPDES permit expires.</td>
</tr>
</tbody>
</table>
Appendix 3.3: State-by-state summary

Missouri

Sources: 10 CSR 20-6.300(5)(B), 10 CSR 20-6.010(4)(C), 10 CSR 20-6.020(1)(B), 10 CSR 20-6.010(5)(B), RSMO 640.715.3., RSMO 644.051.(1-2)

In Missouri, concentrated animal feeding operations (CAFO) are required to obtain construction and operating permits. If DNR fails to issue or deny with good cause a construction or operating permit, they will refund the application fees. Seeking and obtaining these permits are detailed in the following table.

Table 3.3-2. Steps and time with obtaining permits for a CAFO in Missouri.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neighbor Notice Requirements</td>
<td>Sent to DNR, county board, and all adjoining property owners within 1 ½ times the buffer distance. DNR requires proof of notification upon accepting a construction permit. Neighbor notice will expire if a construction permit has not been received by the department within 12 months of initiating the neighbor notice requirements.</td>
</tr>
<tr>
<td>Construction Permit</td>
<td>Application sent to DNR. Construction application must be received by DNR 180 days in advance of construction. DNR shall issue or deny construction permit within 60-180 days of the department’s receipt of an application.</td>
</tr>
<tr>
<td>Neighbor Notice Public Comment Period</td>
<td>After construction application is received, comment period with begin for a thirty day period.</td>
</tr>
<tr>
<td>Public notice for a Draft Operating Permit (Site-Specific Permit only)</td>
<td>A public notice of permit pending shall be a period of not less than 30 days following the date of public notice when interested persons may submit their written views on the proposed permit.</td>
</tr>
<tr>
<td>Construction Permit</td>
<td>Application is approved/denied by DNR.</td>
</tr>
<tr>
<td>Operating Permit</td>
<td>Application sent to DNR. Operating permit application for a facility that had a valid construction permit and a prior public notice shall be received by DNR at least 30 days before facility begins to receive wastewater.</td>
</tr>
<tr>
<td>Operating Permit</td>
<td>Application is approved/denied by DNR. DNR will approve/deny within 60 days of receipt of the application.</td>
</tr>
</tbody>
</table>
Iowa

Sources: IC 459.303, IAC 567-65.4, IAC 567-65.9(1), IAC 567-65.10, IAC 567-65.7

Table 3.3-3. Permitting an open feedlot in Iowa

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Permit</td>
<td>An open feedlot that is required to obtain a construction permit shall apply at least 90 days before the date that construction, installation, or modification of the manure control system is scheduled to start.</td>
</tr>
<tr>
<td>Operating Permit</td>
<td>A person intending on expansion or new animal feeding operations requiring an operating permit shall apply for an operating permit at least 180 days prior to the date operation is scheduled. Operation of the new or expanded part of the facility shall not begin until an operating permit has been obtained.</td>
</tr>
</tbody>
</table>

Table 3.3-4. Permitting a confined feeding operation in Iowa.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notification</td>
<td>Delivery of construction permit application and manure management plan to all affected counties</td>
</tr>
<tr>
<td>Construction Permit</td>
<td>Construction permit application sent to IDNR</td>
</tr>
<tr>
<td>Proof of Public Notice</td>
<td>County shall submit to IDNR within 30 days of construction permit receipt in county, proof that county provided public notice</td>
</tr>
<tr>
<td>County Comments/Evaluations</td>
<td>IDNR must receive county comments or evaluations (use of Master Matrix program if applicable) for approval/disapproval no later than 30 days following applicant’s delivery of construction permit application to IDNR.</td>
</tr>
<tr>
<td>Decision on Construction Permit</td>
<td>IDNR approves/disapproves the permit. IDNR will make a determination regarding the approval or denial of permit within 60 days after they receive a complete application.</td>
</tr>
</tbody>
</table>

Indiana

Source: IC 13-18-10-2.1(a), 327 IAC 15-15-4, 327 IAC 15-15-7, 327 IAC 16-7-12, 327 IAC 16-7-13, 327 IAC 16-8-12

Indiana currently requires operations meeting the definitions of a CAFO and CFO to obtain permits. A CAFO must obtain a NPDES general or individual permit in order to operate. A CFO must only obtain and maintain a CFO approval. The application for a CFO approval constitutes a NOI for a NPDES general or individual permit. A CAFO that has a general permit is not required to renew a CFO approval.
### Table 3.3-5. Permitting a confined feeding operation in Indiana

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Notification</td>
<td>The CFO approval application must be sent to all adjoining property owners, people who reside on adjoining land, and office of county commissioners. It must be completed within 10 working days of filing an application</td>
</tr>
<tr>
<td>Public Comment Period</td>
<td>Only required if the CFO has conducted confined feeding activities and has had a discharge prior to the application of approval or if the CFO applying for approval has greater than 6000 cattle; 12,000 swine or sheep; or 600,000 fowl. Upon receipt of an application package, IDEM shall provide notice of receipt of the application to 1) the owner/operator 2) public through notice in newspaper 3) local officials. A comment period of at least 30 days following the date of public notice of the receipt by the department of an approval application is provided. A public hearing may be requested.</td>
</tr>
<tr>
<td>CFO Approval</td>
<td>The CFO approval requires a determination not later than 90 days after the date the department receives the completed application, including all required supplemental information, unless the department and the applicant agree to a longer time.</td>
</tr>
<tr>
<td>Construction</td>
<td>The owner/operator must notify the commissioner when construction of the waste management system begins.</td>
</tr>
</tbody>
</table>

### Table 3.3-6. Permitting a concentrated animal feeding operation in Indiana.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notice of Intent</td>
<td>Any person proposing a new CAFO facility within the permit boundary shall submit a Notice of intent (NOI) at least 180 days before the date is populated with animals.</td>
</tr>
<tr>
<td>Public Notification</td>
<td>Public notification of application submittal- must be sent to all adjoining property owners, people who reside on adjoining land, and office of county commissioners. It must be completed within 10 working days of filing an application</td>
</tr>
<tr>
<td>Public Comment Period</td>
<td>Only required if the CAFO has conducted confined feeding activities and has had a discharge prior to the application of approval or if the CAFO applying for approval has greater than 6000 cattle; 12,000 swine or sheep; or 600,000 fowl. Upon receipt of an application package, IDEM shall provide notice of receipt of the application to 1) the owner/operator 2) public through notice in newspaper 3) local officials. A comment period of at least 30 days following the date of public notice of the receipt by the department of an approval application is provided. A public hearing may be requested.</td>
</tr>
<tr>
<td>Operating Permit</td>
<td>Following submittal of the NOI to IDEM, IDEM will review the application, determine whether a general or individual permit is needed, request additional information if needed and notify the facility within 90 days of the receipt of the NOI whether the facility does or does not qualify for a general permit or must submit an individual NPDES permit application.</td>
</tr>
<tr>
<td>Construction</td>
<td>The owner/operator must notify the commissioner when construction of the waste management system begins.</td>
</tr>
</tbody>
</table>
The Oklahoma CAFO license is required for all CAFOs, any person that has filed a notice of intent to be covered under NPDES general permit issued by EPA, any animal feeding operation possessing a NPDES permit or any animal feeding operation designated as a significant contributor of pollution by OK Dept of Agriculture or director of U.S. EPA.

Oklahoma is a unique state, whereas the state has not been authorized as the permitting authority to implement the NPDES program, which would include the CAFO program. The Regional EPA Office administers the CAFO program so the federal rule and regulations apply to animal feeding operations in the state of Oklahoma. But Oklahoma also has a separate state program that enforces rules and regulations to livestock operations. Oklahoma requires CAFO operations to apply for a CAFO license to operate in the state.

Table 3.3-7. Permitting a concentrated animal feeding operation in Oklahoma.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submittal of CAFO License</td>
<td>For new, previously unlicensed, or expansion applications for a CAFO license, a maximum of 60 working days from the date the application is received by the department is allocated for investigation, evaluation, and review for completeness of application. For good cause, the Department may take an additional 30 working days to review the application. Good cause shall include but not be limited to a heavier than normal receipt of applications by the department.</td>
</tr>
<tr>
<td>Notice Requirements</td>
<td>After the review and submittal of any required information, affected property owners must receive individual notification. The 20-day public review period starts no earlier than following the mailing of the individual notices. Public notice must be published as a legal notice in at least one newspaper.</td>
</tr>
<tr>
<td>Hearings Requirements</td>
<td>Requests for a hearing must be made within the public comment period. The public comment period will be extended to the hearing date if hearing is requested. An administrative law judge shall, within 30 days after the comment period, give a written report and recommendation to the Oklahoma Department of Agriculture. If the hearing is waived, the application will be presented for consideration at the next regularly meeting of the board.</td>
</tr>
<tr>
<td>Building Permit</td>
<td>After notice and hearing requirements completed, the Oklahoma Department of Agriculture and the Board of Agriculture will issue a building permit.</td>
</tr>
<tr>
<td>CAFO License</td>
<td>A CAFO license will be granted once the construction is completed in accordance with the CAFO license application. If the board does not issue a license, the Oklahoma Department of Agriculture shall provide the owner written notification within 20 days of denial. The notification shall explain and tell what steps are necessary for issuance of a license.</td>
</tr>
<tr>
<td>Notice of Intent</td>
<td>Owners or operators of facilities must submit a Notice of Intent (NOI) to be covered by an operating permit. Notifications must be made to EPA and Oklahoma Department of Agriculture within 90 days of issuance of this permit or upon completion of new facility.</td>
</tr>
<tr>
<td>Operating Permit</td>
<td>New or renewal NPDES operating permit must be filed 180 days prior to startup if you are a new facility or before your NPDES permit expires.</td>
</tr>
</tbody>
</table>
3.4 Tests, Records and Reports

Recommendations:

- It is recommended that Missouri evaluate what information is critical to document regulatory compliance and which could more efficiently be maintained on-site, available for inspection. Limit the reports sent to MDNR to critical information.

- It is recommended that Missouri Department of Natural Resources (MDNR) must demonstrate that a CAFO presents a clear water quality danger before it can require manure, soil and surface water quality testing beyond what is required for the general permit.

- It is recommended that the MDNR specify testing frequency of manure, soil and surface water in accordance with clearly demonstrated, scientific physical, biological and chemical processes. For example, DNR would need to justify why, given current manure sampling techniques, it would expect monthly manure testing to provide useful information.

Highlights and Impacts:

- Missouri (general permits) and Indiana require submission of annual reports; Missouri (site specific permits) and Iowa require submission of quarterly reports.
- Oklahoma has no reporting requirements but requires that compliance records be maintained and available for inspection by the Oklahoma Department of Agriculture.
- All states require reporting of discharges.
- All states require recordkeeping and/or reporting of land application activities and manure storage facility management.
- The intensity of recordkeeping and/or reporting requirements (e.g. which nutrients must be tested) differ among states and among types of operating permits within states.
- Oklahoma LMFO permits and Missouri site specific permits have the most extensive testing requirements. The table below shows a sampling of what tests are mandated in different states.
Tests, records and reports are used by regulatory agencies to verify and document environmental quality and regulatory compliance. Soil, manure and water tests necessary for decision making (e.g. determining land application rates) or that clearly measure environmental impact related to the regulated entity are reasonable. Not all tests that are currently required have clear objectives relating to the regulated entity (e.g. monitoring of elements not having an environmental impact). Excessive testing can be an economic and time-consuming burden to businesses without benefiting the environment.
Verification of compliance with animal feeding operation permits can be accomplished via periodic reports sent to regulating authorities or by maintaining records at the business that are available for inspection by regulating authorities. Periodic reports submitted to regulatory agencies have the following benefits: 1) reports document compliance; 2) reporting deadlines provide incentives to producers to maintain records and document compliance; 3) regulating authorities have records readily available; and 4) reports provide information to researchers and watchdog groups interested in environmental quality.

Periodic reports submitted to regulatory agencies pose the following problems: 1) the quantity of reported material overwhelms regulators unable to use or effectively store the reports; and 2) unless otherwise specified, information in reports is public information that may be used against the reporting entity or may reveal proprietary business information.

Maintenance of on-site records, available for inspection, document compliance without the problems associated with sending reports to regulatory agencies. On-site records lack accountability of routine compliance documentation and may make regulatory oversight more difficult.
Appendix 3.4: State-by-state summary

Missouri

Sources: 10 CSR 20-6.010(8), DNR Annual Report Instructions, MO-G01 Operating Permit, Missouri Site-Specific Operating Permits

Missouri currently has two different types of operating permits – general and site-specific. Each type of permit requires a different level of reporting for characteristics of the operation.

**General Permit**
This permit applies to Class I operations except for Class IA operations with a wet manure handling system. A permit monitoring report, provided by DNR, must be submitted annually by January 28th for the previous calendar year. The annual report consists of seven parts:
- Land application log including field identification, acres, application rates, crop, planned and actual yields;
- Non-owned land application areas- list the landowner names, addresses, legal descriptions and number of acres of all manure applied to non-owned land;
- Bulk sales and give aways- list amounts of manure sold or given away by name of the recipient;
- Daily rainfall data;
- Lagoon or storage basin levels – report monthly water level readings and date taken;
- Land application limits – when application rates are based on the Nutrient Management plan or Plant Available Nitrogen method report manure and soil testing results, nitrogen available to plants and available nutrients applied to crops grown; and
- Discharge Monitoring.

**Site-Specific Permit**
Site-specific permits are required for Class IA operations with wet manure handling systems. Each permit is specific to the permitted operation and will vary from other operations. DNR has the right to require monitoring, reporting, public notice or other things deemed appropriate. Reports are required annually on January 28th with some specific reports submitted on a quarterly basis. Table 3.4-2 has some of the specific monitoring requirements of existing site-specific permits. Some of the effluent limitations and monitoring requirements are:
- Emergency Discharge Monitoring;
- Nutrient Monitoring for Land Application;
- Land Application Operational Monitoring;
- Storm Water Runoff Limits;
- Fresh Water Lake Monitoring;
• Stream Monitoring;
• All Application Fields – Storm Water Monitoring within 24 hours of Land Application;
• Monitoring of Unauthorized Discharges;
• All Land Application Fields – Soil Monitoring;
• Other Lagoon Monitoring;
• Secondary Containment Monitoring; and
• Water Treatment Plant Sludge Basin Monitoring

Table 3.4-2. Some of the effluent limitations and monitoring requirements in a sample of three Missouri site-specific permits

<table>
<thead>
<tr>
<th>Type of Monitoring</th>
<th>Parameters Measured</th>
<th>Frequency</th>
<th>Reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Discharge</td>
<td>Dissolved Oxygen, Biochemical Oxygen Demand, Ammonia Nitrogen as N</td>
<td>Once/day during discharge</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Nutrient Monitoring for Land Application</td>
<td>Total Kjeldahl Nitrogen as N, Nitrogen as N, Ammonia Nitrogen as N, Total Phosphorus as P, Total Potassium as K, Nitrate + Nitrite as N, Solids</td>
<td>4/year or 1/year except solids (once per month during land application)</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Land Application Operational Monitoring</td>
<td>Freeboard (once/month), land application, amount of land applied, application area, application rate</td>
<td>Daily except freeboard (once/month)</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Storm Water Runoff Limits</td>
<td>Flow, Ph-Units, Ammonia Nitrogen as N, Nitrate/nitrite as N, Dissolved Phosphorus, Total Suspended Solids, Temperature</td>
<td>4/year</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Fresh Water Lake Monitoring</td>
<td>Flow, Ph- Units, Ammonia Nitrogen as N, Nitrate + Nitrite as N, Dissolved Phosphorus, Total Phosphorus as P, Temperature, Total Suspended Solids, Trihalomethanes, Fecal Coliform</td>
<td>5/year, 1/month</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Stream Monitoring</td>
<td>Flow, Ph- Units, Ammonia Nitrogen as N, Nitrate + Nitrite as N, Phosphorus as P, Temperature, Total Suspended Solids, Dissolved Oxygen, Chloride, Fluoride, Dissolved oxygen, Hardness, Total Suspended Solids, Chlorine, Aluminum, Arsenic, Beryllium, Boron, Chromium, Cobalt, Iron, Selenium, Mercury, Cadmium, Copper, Lead, Nickel, Silver, Zinc</td>
<td>1/year in May or 1/month</td>
<td>Quarterly/Annually</td>
</tr>
<tr>
<td>Storm Water Monitoring within 24 hours of Land Application</td>
<td>Ammonia Nitrogen as N, Nitrate + Nitrite as N, Temperature, PH-Units, Date of Runoff, Field Number, Crop, Application Equipment, Application Rate</td>
<td>4/year</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Monitoring of Unauthorized Discharges</td>
<td>Flow (24 hr. estimate), Dissolved Oxygen, Biochemical Oxygen Demand, Ammonia Nitrogen as N, PH – Units, Temperature</td>
<td>once/day during discharge</td>
<td>Quarterly</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Other Lagoon Monitoring</td>
<td>Total Arsenic, Total Copper, Total Molybdenum, Total Nickel, Total Selenium, Total Zinc, Total Suspended Solids, Other Chemical Used at the Facility</td>
<td>2/year in May &amp; Oct</td>
<td>Quarterly</td>
</tr>
</tbody>
</table>

**Iowa**

Sources: IAC 567-63.5, IAC 567-65.17

The following self-monitoring requirements may be imposed on an animal feeding operation in any operating permit. Reports of the self-monitoring results would be submitted to the Iowa Department of Natural Resources (IDNR) quarterly.

- Measurement of liquid level in a waste storage facility on a periodic basis.
- Measurement of daily precipitation, as appropriate.
- Sampling and analysis of groundwater as necessary to determine effects of wastewater application.
- Other measurements necessary to evaluate the adequacy of a waste disposal system.

Confinement feeding operations, larger than 500 animal units and excluding egg washwater storage structures, are required to submit an updated manure management plan on an annual basis. The updated plan must reflect all amendments made during the period of time since the previous plan was submitted. The updated plan must be sent to IDNR, the board of supervisors of each county where the operation is located and each county where the manure from the confinement feeding operation is being land-applied. IDNR will review and approve or disapprove all complete manure management plans within 60 days of the date they are received.

The manure management plan distinguishes between manure used by the animal feeding operation and manure sales. General requirements of the plan include:

- Calculations to determine land area required for manure application;
- Total nitrogen available (table values or actual nitrogen content may be used);
- Estimate of the annual animal production and manure volume or weight produced (table values or actual manure sampling may be used); and
- Statements of intent to sell the manure, if appropriate;
When the animal feeding operation does not sell the manure, the following information should be included in the plan and compliance demonstrated in the report:

- Optimum crop yield and crop usage rate for crops in the crop schedule;
- Manure application methods, application rate and dates of the application;
- Location(s) and acres of each field on which manure was applied (must include written agreements with owner where the manure was applied if not owned or rented for crop production);
- Methods, structures or practices that will be used to reduce soil loss and prevent surface water pollution (conservation plan for highly erodible cropland); and
- Methods and practices that will be utilized to reduce odor if spray irrigation equipment is used to apply manure.

When manure is sold, the manure sales form with the following information should be included in the report: name and address of buyer, quantity of manure purchased, optimum crop yield usage rate, method of manure application, timing of manure application, location and size of application field and application rate.

The owner of a confinement feeding operations must maintain a current manure management plan at the site of the operation. Records of manure application must be maintained and available for IDNR inspection at the confinement site. Records must be maintained for three years after the year of manure application or for the length of the crop rotation, whichever is greater.

Also, a release must be reported to IDNR with a verbal report within as soon as possible but not later than 6 hours and a written report within 30 days.

**Indiana**

**Sources:** 327 IAC 16-7-11, 327 IAC 15-15-10, 327 IAC 5-1-3, 327 IAC 16-9-5, 327 IAC 16-10-1, 327 IAC 16-10-2, 327 IAC 16-10-5

**CFO**

An operating record must be maintained for a confined feeding operation (CFO). The following information must be maintained and updated in the operation record.

- All valid approvals, modifications and notifications to the approvals.
- Current manure management plan.
- Current emergency spill response plan.
- Records of monthly self-inspection reports for the past three years.
- Documentation of any spill response implemented by the CFO within the past five years.
- Information about the acreage used for land application including:
1. The calculation of the minimum amount of acreage needed for manure application;
2. The amount of acreage available for application of manure;
3. Land use agreements for any additional acreage needed for requirements;
4. Updated documentation when there are changes in acreage required for application of the manure;
5. Copies of written waivers if there is a reduction in the property line setback distances.

- Records of land application activity on each field that has received manure for the previous five years:
  1. Type of manure applied;
  2. Results of manure test;
  3. Soil tests;
  4. Amount of manure applied;
  5. Application method used;
  6. Number of acres and locations on which manure was applied;
  7. Dates on which manure was applied; and
  8. Agronomic rates of crops for potentially available nitrogen used to apply manure to each field.

- Records from past three years of any person who purchased or received more than 2,000 gallons or 10 cubic yards of manure. This information must be kept:
  1. Name and address of the buyer or receiver;
  2. Amount of manure received; and
  3. Copy of the manure management information sheet.

CAFO
If a CFO meets the definition of a CAFO, all CAFO NPDES general permits holders must submit an annual report to the commissioner by February 15th of each year for the previous calendar year. The following information must in the annual report to IDEM.

- Number and type of animals, whether in open confinement or housed under a roof.
- Estimated amount of total manure, litter, and process wastewater generated by the CAFO.
- Estimated amount of total manure, litter, and process wastewater transferred to other persons by the CAFO.
- Total number of acres for land application covered by the manure management plan.
- Total number of acres under control of the CAFO that were used for land application of manure, litter, and process wastewater.
- Summary of all manure, litter, and process wastewater discharges from the production area, including the date, time, and approximate volume for each discharge.
- Copy of a soil test and a manure test along with the manure application records.
Other types of monitoring may be imposed on an operation requiring a general permit. Some of information that may be required includes sampling effluents, sampling waste streams, and providing data on raw materials, catalysts, intermediate products, by-products, production rates and other related process information.

Oklahoma

Source: OAC 35:17-3-11, 58 FR 7610, OAC 35:17-3-6, OAC 35:17-5-7

Oklahoma has three levels of record keeping requirements.

CAFO
All licensed CAFOs must perform the following tests which serve as records and are sent in with the annual CAFO license renewal.

- Groundwater from all existing water wells located at the facility and land application sites (tests for nitrate-nitrogen, total phosphorous, and fecal coliform bacteria levels).
- All surface water impoundments located at the facility and land application sites (nitrate-nitrogen and total phosphorous).
- Soil tests from land application sites (nitrate-nitrogen and total phosphorous).
- Waste retention structure contents test (unspecified parameters) at least every three years (more frequently at an individual facility at the Department of Agriculture’s request).

The following records must be maintained.

- Weekly measure of water level in the retention facility.
- Quarterly inspection and maintenance reports.
- Other specific information required by the Department.

All tests and records must be maintained for three years and available for inspection at the site. Incidents such as spills, or other discharges, along with other information describing the pollution potential and quantity of the discharge shall be included in the records.

LMFO
A higher level of record keeping is required for Licensed Managed Feeding Operation (LMFO). An LMFO is a swine or poultry CAFO primarily using a liquid animal waste management system, where animals are primarily housed in a roof-covered structure. LMFOs have the following requirements in addition to the tests for CAFOs listed above.

- Annual groundwater tests for electrical conductivity, pH, ammonium-nitrogen.
- Annual soil tests for electrical conductivity, pH, ammonium-nitrogen, organic matter, sodium, potassium, calcium, magnesium, available phosphorus, and total nitrogen.
- Annual waste retention structure contents tests for ammonium-nitrogen, nitrate-nitrogen, total phosphorus, electrical conductivity, pH, sodium, potassium, calcium, magnesium, total nitrogen, and total solids prior to the first land application of the calendar year. Additional parameters may be required by the Department of Agriculture's request.

All tests shall be performed by an Oklahoma Department of Environmental Quality certified independent testing laboratory with all costs paid by the owner. Owners of LMFOs shall retain all tests and records on site for as long as the facility is in operation.

**Poultry Operations**
Additionally, any poultry operation must maintain the following records for a six year period and be available for inspection.
- Poultry waste application records, rates and dates of application.
- If poultry waste is sold or given away, must keep dates of removal, name of recipient, amount of poultry waste and nutrient sample analysis.

Soil and poultry waste analysis date must be retained for as long as the site has been in operation.
3.5 Transfer of Ownership for Permits

**Recommendation:**

Upon the sale of a business, allow the transfer of general permit to the new owner contingent upon the new owner following the terms of the permit. This is allowed for site-specific permits so there is no clear basis for it not being allowed for general permits (smaller operations).

**Highlights and Impacts:**

- Missouri does not allow the transfer of general operating permits, construction letter of approvals or construction permits. Site-specific permits may be transferred if there are no significant changes in the facility.
- All allowed permit transfers for the selected states must be within a set time period.
- Iowa’s operating permit and Indiana’s CFO approval have criteria in the regulations that have eliminated the possibility of needing a new permit.
- In Missouri, the previous owner is still liable for compliance with a general operating permit until the new owner obtains a new operating permit.

Transfer of ownership has no anticipated effect on water quality because operations continue to operate under the conditions of an existing permit. This would be a substantial benefit to the farmer because it removes uncertainty that the facility will continue to operate through an ownership transfer. Capital providers would have a greater interest in this model for the same reason. This mechanism is allowed for site-specific permits so there is no clear reason for it not being allowed for general permits (smaller operations).

Some of the issues associated with transferability of permits are who is liable for any violations after the sale and if a purchaser of an existing facility could be denied an operating permit?

A transfer of ownership fee could be charged to cover regulatory agency expenses.
Table 3.5-1. Permits required to operate in selected states

<table>
<thead>
<tr>
<th>State and Permit Type</th>
<th>Liability for violations after the sale</th>
<th>Possible denial of an operating permit after purchase or require a new permit</th>
<th>Time frame for transfer of permits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri-General Permit</td>
<td>Yes</td>
<td>Yes</td>
<td>No transfer allowed</td>
</tr>
<tr>
<td>Missouri-Site-specific permit</td>
<td>No</td>
<td>Yes</td>
<td>30 days for decision</td>
</tr>
<tr>
<td>Iowa-Operating permit</td>
<td>No</td>
<td>No</td>
<td>30 days for transfer</td>
</tr>
<tr>
<td>Indiana-CFO Approval</td>
<td>No</td>
<td>No</td>
<td>45 days for transfer</td>
</tr>
<tr>
<td>Indiana-NPDES permit</td>
<td>No</td>
<td>Yes</td>
<td>30 days for transfer or decision</td>
</tr>
<tr>
<td>Oklahoma-CAFO license</td>
<td>No</td>
<td>Yes</td>
<td>30 days for decision</td>
</tr>
<tr>
<td>Oklahoma-NPDES permit</td>
<td>No</td>
<td>No</td>
<td>30 days for transfer</td>
</tr>
</tbody>
</table>
Appendix 3.5: State-by-state summary

Missouri

Sources: MDNR Form F, 10 CSR 20-6.010(11), 10 CSR 20-6.010(13), 10 CSR 20-6.300(6)(H)

A construction letter of approval, construction permit or general operating permit may not be transferred.

The following situations allow for transfer of permits or approvals.

- A site-specific operating permit may be transferred to a new owner if no significant changes in the facility. Until the permit is officially transferred, the original permittee remains responsible for complying with the permit. The department will notify the new applicant within 30 days of its intent to revoke and reissue or transfer the permit. The fee for the transfer is 25% of annual fee ($1,250) and requires the submission of DNR Form F.

- Transfers of an operating letter of approval may be made on DNR Form F, signed by the new owner or other continuing authority or responsible party. Within 60 days of receiving the transfer application, DNR will notify the new applicant that the letter of approval is transferred or revoked. If the department fails to notify within the time frame, the new applicant is considered the new owner or responsible party.

When the owner or operators of a general permit changes, the operation simply applies for a new general permit. If the ownership of a facility under construction changes, the new owner shall apply for a new construction permit.

Iowa

Source: IAC 567-65.21

If title or legal responsibility for a permitted animal feeding operation and its animal feeding operation storage structure is transferred, the person to whom title or legal responsibility is transferred shall be subject to all terms and conditions of the permit and these rules. The person to whom the permit was issued and the person to whom title or legal responsibility is transferred shall notify the department of the transfer of legal responsibility or title of the operation within 30 days of transfer. Within 30 days of receiving a request from the department, the person to whom legal responsibility is transferred shall submit to the department all information needed to modify the permit to reflect the transfer of legal responsibility.
Indiana Sources: 327 IAC 15-15-7(f), 327 IAC 16-7-7

Indiana has separate requirements for CAFOs and CFOs.

For CFOs Required to Maintain a CFO Approval
Indiana requires a request for approval transfer can be made on a form developed by the Indiana Department of Environmental Management (IDEM). Within the form, it specifies all of the current operation information, existing violations if they exist and signatures of both parties acknowledging the transfer. The existing violations are written to state which party assumes responsibility for correction.

An approval issued by the IDEM shall be transferred to another person by the current approval recipient if, at least 45 days prior to the date of the proposed transfer of the approval: (1) the current approval recipient notifies the commissioner of the proposed transfer; and (2) a written agreement is submitted to the commissioner containing a specific date of transfer of approval responsibilities; and identification of responsibility for any violations existing at the time of transfer.

For CAFOs Required to have an NPDES Permit
Indiana does not allow for the Notice of Intent (NOI) submission requirements to be transferred. If ownership of a facility is transferred to a new person, that person must submit a new NOI or apply for an individual NPDES permit under 327 IAC 5. The new owner must submit the NOI at least 30 days prior to beginning operation at the transferred facility. The application for a CFO approval constitutes a NOI for a NPDES general or individual permit

The general permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued to identify the new permittee and incorporate such other requirements as may be necessary under the Clean Water Act. A permit may be transferred to another person by the permittee, without modification or revocation and re-issuance being required if the following occurs:

- The current permittee notifies the commissioner at least 30 days in advance of the proposed transfer date;
- A written agreement containing a specific date for transfer of permit responsibility and coverage between the current permittee and the transferee (including acknowledgement that the existing permittee is liable for violations up to that date and that the transferee is liable for violations from that date on) is submitted to the commissioner;
• The transferee certifies to the commission intent to operate the facility without making material and substantial alterations or additions to the facility that would change the nature or quantities of pollutants discharged; and
• The commissioner, within 30 days, does not notify the current permittee and the transferee of the intent to modify, revoke and reissue, or terminate the permit and to require that a new application be filed rather than agreeing to the transfer of the permit.

Oklahoma

Source: OAC 35:17-3-10, 40 CFR 122.61

The following information pertains to transfer of the CAFO licenses in the state of Oklahoma.

• Transfer of a CAFO license to a new owner or lessee shall meet the following conditions: (1) Upon approval of the transfer of a license, the transferee shall provide to the department within 30 calendar days, a notarized statement and other proof of transfer of ownership or occupancy as the department requires; (2) If a transfer is denied by the department, the transferee may, within 30 calendar days after receiving notification of the denial, request in writing a hearing to review the denial of the transfer. In addition to the items which are considered at the hearing, the administrative law judge may also hear evidence and witnesses on the issue of whether a substantial change of condition has occurred since the issuance of the original license and whether the changes should result in a denial of the transfer of the license.

The EPA administers the NPDES program in the state of Oklahoma. Any NPDES permit may be automatically transferred to a new permittee if:

• The current permittee notifies the director at least 30 days in advance of transfer;
• The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them; and
• The director does not notify the existing permittee and the proposed new permittee of his or her intent to modify or revoke and reissue the permit.

If the above transfer method is not used, a permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued, or a minor modification made, to identify the new permittee and incorporate such other requirements as may be necessary under the Clean Water Act.
### 3.6 Permit Modification

**Highlights and Impacts:**

- In many industries, changes cannot be made in an existing permit. Some examples include hazardous waste, solid waste and air quality. A CAFO is a 20-year investment that operates with no more than a 5-year regulatory window. This situation can make regulatory compliance difficult to plan and budget financially.

- The reopener clause in the CAFO permit allows DNR to make a change in the permit during the life of the permit. This can create production and financial hardship for the producer. This uncertain situation may discourage investors from providing loans to animal producers.

- All states seem to have similar reopener clauses that allow permits to be modified by the regulating authority under conditions required to protect water quality or if the permit conditions are violated.
Appendix 3.6: State-by-state summary

Missouri

Sources: M0-G01 General Permit, MO Site-Specific Permit

General and site-specific permits both have reopen clauses specified that would allow for the permit to be changed for a variety of reasons.

Site-Specific Permit

Site-specific permits have the following information stated in the permit.

- This permit may be reopened and modified or alternatively revoked and reissued, to incorporate new or modified limitations or other conditions pertaining to phosphorous application rates to soils, the adequacy of wastewater lagoon liners, or other special conditions as may be necessary to protect the waters of the state.

- The permit may be modified or reopened to require the submittal of a Comprehensive Nutrient Management Plan (CNMP) in accordance with USEPA and USDA guidelines and regulations or where determined appropriate by the department to meet water quality standards for nutrients. This determination may be based upon ambient water quality monitoring, Section A monitoring requirements and other applicable information.

- This permit may be reopened and modified or alternatively revoked and reissued to incorporate new or modified effluent limitations or other conditions if, as the result of a watershed analysis, a Total Maximum Daily Load (TMDL) limitation is developed for receiving waters which are currently included in Missouri’s list of waters of the state not fully achieving the state’s water quality standards.

General Permit

General permits have the following information stated in the permit.

This permit may be reopened and modified, or alternatively revoked and reissued, to:

- Comply with any applicable effluent standard or limitation issued or approved under Sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a)(2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:
  1. Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
  2. Controls any pollutant not limited in the permit.

- Incorporate new or modified effluent limitations or other conditions, if the result of a waste load allocation study, toxicity test or other information indicates changes are necessary to assure compliance with Missouri’s Water Quality Standards.
Incorporate new or modified effluent limitations or other conditions if, as the result of a watershed analysis, a TMDL limitation is developed for the receiving waters which are currently included in Missouri’s list of waters of the state not fully achieving the state’s water quality standards, also called the 303(d) list.

The permit as modified or reissued under this paragraph shall contain any other requirements of the Clean Water Act then applicable.

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**Iowa**

*Source: IAC 567-65.6(11)*

Iowa DNR may modify, suspend, refuse to renew or revoke in whole or part any operation permit for cause. Cause for modification, suspension or revocation of a permit may include the following:

- Violation of any term or condition of the permit;
- Obtaining a permit by misrepresentation of fact or failure to disclose fully all material facts;
- A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge;
- Failure to submit the records and information that the department requires in order to ensure compliance with the operation and discharge conditions of the permit; or
- A determination by the department that the continued operation of a confinement feeding operation constitutes a clear, present and impending danger to public health or the environment.

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**Indiana**

*Sources: 327 IAC 5-2-8(4)(A), 327 IAC 5-2-8(4)(C), 327 IAC 5-2-16(b), 327 IAC 16-7-5*

Indiana has two ways of imposing changes to permits. Confined feeding operations (CFOs) that are required to maintain a current approval allow for amendments to change. Operations that are required to maintain a NPDES permit have different rules to allow permit modification.

**CFO Required to Maintain CFO Approval**

The commissioner may issue amendments to approvals of a confined feeding operation at any time:

- Pursuant to Water Pollution Control Law;
- To address phosphorous limits if adequate information indicates that the application of manure to land represents a water quality threat;
• At request of the applicant to address changes of the operation;
• As a result of an agreement between the department and owner/operator; or
• Reduction in storage capacity that results in less than 180 days storage capacity.

CAFO Required to Maintain General Permit
Permits may be modified, revoked and reissued or terminated for cause. Some of the ways, but not limited to, include:
• If any applicable effluent standard is established under Section 307(a) of the Clean Water Act for a toxic pollutant injurious to human health and that standard is more stringent than any limitation upon such pollutant in the permit, the commissioner shall institute proceedings to modify or revoke and reissue the permit to conform to the toxic effluent standard or prohibition;
• Violation of any term or condition of the permit;
• Failure of the permittee to disclose fully all relevant facts or misrepresentation of any relevant facts by the permittee in the application or during the permit issuance; or
• A change in any condition that requires either a temporary or a permanent reduction or elimination of any discharge controlled by this permit.

Oklahoma

Sources: 58 FR 7610, OAC 35:17-3-8

General Permit
The EPA has a reopener clause in the Oklahoma general permit that would allow for permit modification:
• If the effluent limitations or requirements are established or modified in an approved State Water Quality Plan or Waste Load Allocation and if they are more stringent than those listed in this permit or control a pollutant not listed in this permit, this permit may be reopened to include those more stringent limits or requirements; or
• The permit may be modified, revoked or reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

CAFO License
An application for license renewal shall be submitted prior to July 1 of each year the license is to be renewed. Any license for which a renewal application is received prior to the renewal date established by statute is considered to be valid until a final determination is made. The determination shall be made after a review by the department.
Renewals meeting the requirements shall be reissued a license unless sufficient cause to terminate or revoke the license is shown. If corrections of the renewal application are required, the owner shall have 20 working days from the date of notification to make all necessary revisions.
Chapter 4:
Facility Design and Land Application

4.1 Setbacks

Concentrated animal feeding operation regulations include two types of setbacks:
- Setbacks of land application activities from water, property boundaries and other features.
- Setbacks of manure storages and animal production facilities from non-owned residences and other features.

Section 4.1.1 addresses land application setbacks and section 4.1.2 deals with facility setbacks.

The underlying rationale for the Clean Water Act is to protect water quality. In our analysis we compare setback distances among states and consider the environmental benefits to specific setbacks.

Setbacks for land application are designed to prevent transport of a relatively small concentration of manure spread across the landscape into lakes, streams, wells and other water resources. In contrast, the setbacks from liquid handling facilities seek water quality protection from catastrophic failure or major spill from a manure storage system. Facility setbacks also seek to prevent the transport of dust to surface waters.

One challenge that needs to be addressed in setback standards is the connection between setback requirement and water quality. The rationale of setbacks under the Clean Water Act is that imposing a minimum distance between a facility or land application activities and a water feature or resource will reduce the potential movement of contaminants into water. The water quality benefit is less apparent for separation distances between land application areas or facilities and residences or public buildings. There are public benefits of such setbacks but they are not clearly water quality benefits.

Setbacks for land application of manure can reduce the potential contamination of water with manure constituents in three ways.

1. Setbacks reduce the potential for runoff carrying surface applied manure to reach a stream by filtering the manure constituents out of the runoff water and increase the probability runoff water will infiltrate into the soil and never reach the water resource. There has been extensive research on the effectiveness of buffers and this research demonstrates that beyond a certain distance, the effectiveness of...
filter strips does not significantly increase. The effectiveness of filter strips is much greater with strips designed as permanent protective vegetative buffers.

2. Setbacks similarly reduce the potential for subsurface water flow to reach a stream by forcing soil water to contact more soil reducing the potential for the transport of some nutrients. Effective riparian zones have also been shown to reduce nitrate movement to the stream through denitrification.

3. Setbacks reduce the potential for drift from surface applications of dry and liquid manure to reach surface water.

Water quality regulations for CAFOs only address manure management on setbacks so there is no restriction on the use of commercial fertilizers in areas where manure application is restricted. Another area of ambiguity is how management of vegetated filters differs from management of pastures or hay fields.

The impact of setbacks on competitiveness between states may not be easy to delineate from the regulations. Setbacks can create a complicated landscape of areas that can receive manure and those that cannot. The total effect would require an analysis of what percentage of land is excluded from use by livestock producers.

The impact of setbacks will vary based on the density of the setback features (wells, streams and residences) and the size and proximity of fields. Larger setbacks can effectively eliminate a field from availability for manure application. They also make it less likely that a farmer could afford to convert the setback region to a permanent vegetative cover – which might have increased water quality benefits.

4.1.1 Land Application Setbacks

Recommendations:

There are opportunities to protect water quality while reducing land application setbacks in Missouri.

- Reduce setbacks from certain water resources when vegetated buffers are used as is done in the revised USEPA CAFO regulations.

- Adjust land application setback distances based on land application methods for all permitted operations.

Highlights and Impacts:

- All studied states require setbacks from drinking water wells.
- All studied states except Oklahoma require setbacks from streams and other surface water features, and connections between surface and groundwater.
- All studied states have setbacks from property boundaries or residential buildings. In Iowa these restrictions only apply to irrigated or unincorporated liquid manure.
- Indiana, Iowa and Missouri reduce many setbacks with injection or incorporation of liquid manure. In Missouri, most of these adjustments only apply to site-specific permits typically associated with the largest operations.
• The actual setback from any feature has a wide potential range among states (0 to 800 feet) in all categories except property line setbacks which range from 0 to 150 feet.
• The revised USEPA regulations allow reducing water quality setbacks to 35 feet when maintained as a permanently vegetative buffer. Iowa and Indiana currently adjusts setback distance based on the presence of filter strips and all studied state setbacks from water resources exceed 35 feet for surface application of manure.
• The types of setbacks and the size of setbacks would be expected to differ among states. Each state has different resources, geographical features and climate that contribute to differences in required setbacks to promote environmental quality.

Table 4.1.1-1. Land application residential and well setback requirements

<table>
<thead>
<tr>
<th>State</th>
<th>Residential setback distances</th>
<th></th>
<th>Well setback distances</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Setback Range (feet)</td>
<td>Adjust</td>
<td>Setback Range (feet)</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td></td>
<td>setback</td>
<td>distances</td>
<td>distances</td>
</tr>
<tr>
<td></td>
<td></td>
<td>distances for land</td>
<td>adjusted</td>
<td>distances</td>
</tr>
<tr>
<td></td>
<td></td>
<td>application method</td>
<td>for buffers</td>
<td>adjusted</td>
</tr>
<tr>
<td>Missouri</td>
<td>50-150</td>
<td>Yes</td>
<td>300</td>
<td>No</td>
</tr>
<tr>
<td>Iowa</td>
<td>0-750</td>
<td>Yes</td>
<td>0-200</td>
<td>Yes</td>
</tr>
<tr>
<td>Indiana</td>
<td>None</td>
<td>No</td>
<td>50-500</td>
<td>Yes</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>0-500</td>
<td>Yes</td>
<td>300</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 4.1.1-2. Land application water and property line setback requirements

<table>
<thead>
<tr>
<th>State</th>
<th>Water resources (streams, cisterns, surface water, etc.) setback distances</th>
<th>Property line setback distances</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Setback Range (feet)</td>
<td>Adjust setback distances</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for land application method</td>
<td>setback</td>
</tr>
<tr>
<td></td>
<td></td>
<td>distances for land application method</td>
<td>distances</td>
</tr>
<tr>
<td></td>
<td></td>
<td>adjusted for buffers</td>
<td>adjusted for buffers</td>
</tr>
<tr>
<td>Missouri</td>
<td>50-300</td>
<td>Yes</td>
<td>25-50</td>
</tr>
<tr>
<td>Iowa</td>
<td>0-800</td>
<td>Yes</td>
<td>0-100</td>
</tr>
<tr>
<td>Indiana</td>
<td>25-200</td>
<td>Yes</td>
<td>0-50</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>None</td>
<td>No</td>
<td>None</td>
</tr>
</tbody>
</table>
Appendix 4.1.1: State-by-state summary

Missouri

Sources: Best Management Practices for CAFOs (Feb 2001), DNR Guide to Animal Feeding Operations (PUB 915, 1999), MO Site-Specific Operating Permits, 10 CSR 20-8.020(15)(B), 10 CSR 23-3.010

Missouri’s separation distances that are required for land application are illustrated in Table 4.1.1-3. Flood-prone areas, which flood at a frequency greater than once every 10 years, should not be the only land available for application of manure.

Table 4.1.1-3. Land application setbacks for Missouri general operating permit.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Separation Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Losing streams, sinkholes, caves, wells, abandoned wells, water supply</td>
<td>300 feet</td>
</tr>
<tr>
<td>structures or impoundments and any other connection between surface and</td>
<td></td>
</tr>
<tr>
<td>groundwater</td>
<td></td>
</tr>
<tr>
<td>Permanent flowing streams</td>
<td>100 feet</td>
</tr>
<tr>
<td>Intermittent flowing streams</td>
<td>50 feet</td>
</tr>
<tr>
<td>Property lines</td>
<td>50 feet</td>
</tr>
<tr>
<td>Privately owned impoundment not used as a water supply</td>
<td>100 feet</td>
</tr>
<tr>
<td>Dwelling or public use area (spray irrigation)</td>
<td>150 feet</td>
</tr>
<tr>
<td>Dwelling or public use area (tank wagon or solid spreader)</td>
<td>50 feet</td>
</tr>
</tbody>
</table>

The following separation distances can be typically found in Missouri site-specific operating permits and apply to the buffers that shall be maintained between the land application site and the other feature. These setbacks offer a reduced setback if the manure is sub-surface injected. The following setbacks apply to typical site-specific operating permits in Missouri.

Table 4.1.1-4. Land application setbacks for Missouri site-specific operating permits.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Surface Application</th>
<th>Sub-surface Injection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Losing streams, open sinkholes, water supply wells or water supply</td>
<td>300 feet</td>
<td>300 feet</td>
</tr>
<tr>
<td>reservoirs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classified gaining streams (Class P and C streams listed in 10 CSR</td>
<td>100 feet</td>
<td>50 feet</td>
</tr>
<tr>
<td>20-7.031)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unclassified gaining streams, public roads or property boundaries</td>
<td>50 feet</td>
<td>25 feet</td>
</tr>
</tbody>
</table>
Sources: IAC 567-65.3(3), IDNR Separation Distances for Land Application of Manure Guidance Document

Table 4.1.1-5 illustrates the land application setbacks for buildings or public use areas that are used in Iowa. These separation distances apply to the source of manure coming from a confinement feeding operation unless the manure comes from a small animal feeding operation (less than 500 AU). These separation distances may also be waived by obtaining a written waiver from the owner of the land benefiting from the required separation distance.

Table 4.1.1-5. Iowa land application separation distances for building and public use areas.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Dry Manure</th>
<th>Liquid Manure (except irrigated)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surface Application</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incorporated within 24 hours</td>
<td>Incorporated after 24 hrs. or not incorporated</td>
</tr>
<tr>
<td>Residence, business, church, school and public use area</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The separation distance information that is found in Table 4.1.1-6 applies to both confinement feeding operations and open feedlots, regardless of size. Some required separation distances have an option for a 50-foot buffer or specify application methods that do not require setbacks.

Table 4.1.1-6. Iowa land application separation distances for water resources.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Dry Manure</th>
<th>Liquid Manure (except irrigated)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surface Application</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incorporated on same date</td>
<td>Not incorporated</td>
</tr>
<tr>
<td></td>
<td>Direct Injection</td>
<td>Surface Application</td>
</tr>
<tr>
<td>Sinkhole, cistern, designated wetland, water source, abandoned well and drinking water well</td>
<td>0</td>
<td>200 ft. (50 ft. with buffer)</td>
</tr>
<tr>
<td>High Quality Water Resource</td>
<td>0</td>
<td>800 ft. (50 ft. with buffer)</td>
</tr>
<tr>
<td>Unplugged ag drainage well and ag drainage well surface inlet</td>
<td>0</td>
<td>200 ft.</td>
</tr>
</tbody>
</table>
Required separation distances for irrigating liquid manure are in Table 4.1.1-7. The 750-foot separation distance for buildings and public use areas apply only to liquid manure from a confinement feeding operation. This 750-foot distance would not apply if the manure was incorporated within 24 hours and the source of manure is a small animal feeding operation (less than 500 AU) or if a written waiver is obtained from the owner of the building or public use area benefiting from the required separation distance.

Table 4.1.1-7. Iowa land application setbacks for irrigated liquid manure.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Irrigated Liquid Manure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Pressure (&lt;25 psi)</td>
</tr>
<tr>
<td>Property Boundary Line</td>
<td>100 ft.</td>
</tr>
<tr>
<td>Buildings or Public Use Areas (residence, school, business, church,</td>
<td>250 ft.</td>
</tr>
<tr>
<td>public use area)</td>
<td></td>
</tr>
<tr>
<td>Designated Areas (sinkholes, cistern, water source, drinking water</td>
<td>200 ft.</td>
</tr>
<tr>
<td>well, abandoned well, designated wetlands)</td>
<td>(50 ft. with buffer)</td>
</tr>
<tr>
<td>High quality water resource</td>
<td>800 ft.</td>
</tr>
<tr>
<td>Unplugged agricultural drainage well, agricultural drainage well</td>
<td>No irrigation allowed</td>
</tr>
<tr>
<td>area (watershed)</td>
<td></td>
</tr>
</tbody>
</table>

Indiana

Source: 327 IAC 16-10-4

Table 4.1.1-8 displays the separation distances that are required for land application in Indiana. The property line setback may be waived if a waiver in writing is produced between the adjoining property owner and owner/operator of the operation. If a properly designed and maintained filter strip is located between the application site and 1) Waters of the state; 2) Any known well; 3) The surficial opening or lowest point of any sinkholes; or 4) Any drainage inlet, including water and sediment control basins, the setback would be the width of the filter strip.

The setback is 10 feet if a gradient barrier is located between the application site and 1) Surface waters of the state; 2) Any known well; 3) The surficial opening or lowest point of any sinkholes; or 4) Any drainage inlet, including water and sediment control basins.

The owner/operator may obtain a reduced setback by demonstrating to IDEM that a different compliance approach would meet the performance standards.
Table 4.1.1-8: Indiana land application setbacks.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Liquid Injection or Single Pass Incorporation</th>
<th>Liquid Incorporation (within 24 hrs.); Pasture Application; Solid; or Composted Manure Application</th>
<th>Liquid Surface Application</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 6% slope or residue cover</td>
<td>&gt; 6% slope</td>
<td></td>
</tr>
<tr>
<td>Public water supply wells &amp; public water supply intake structure</td>
<td>500 ft.</td>
<td>500 ft.</td>
<td>500 ft.</td>
</tr>
<tr>
<td>Surface waters of the state</td>
<td>25 ft.</td>
<td>50 ft.</td>
<td>100 ft.</td>
</tr>
<tr>
<td>Sinkholes</td>
<td>25 ft.</td>
<td>50 ft.</td>
<td>100 ft.</td>
</tr>
<tr>
<td>Wells</td>
<td>50 ft.</td>
<td>50 ft.</td>
<td>100 ft.</td>
</tr>
<tr>
<td>Drainage inlets</td>
<td>5 ft.</td>
<td>50 ft.</td>
<td>100 ft.</td>
</tr>
<tr>
<td>Property lines &amp; public roads</td>
<td>0 ft.</td>
<td>10 ft.</td>
<td>50 ft.</td>
</tr>
</tbody>
</table>

Oklahoma


There are only two separation distances in Oklahoma that pertain to land application of manure. Table 4.1.1-9 shows the separation distances for wells and residences. Surface application of manure may not be applied within the 100-year floodplain or near (sic) water courses.

Table 4.1.1-9. Oklahoma land application setbacks.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Separation Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing public or private drinking water well</td>
<td>300 ft.</td>
</tr>
<tr>
<td>Occupied residence not owned or leased by the owner of the AFO</td>
<td>500 ft. for liquid waste</td>
</tr>
</tbody>
</table>
4.1.2 Facility Separation Distance Requirements

Recommendations:

Missouri should evaluate the environmental impact of setbacks that have no clear water quality benefits and either eliminate them or justify them with other more pertinent legislation (e.g. air quality or zoning). Examples include:

- Facility setbacks from residences and public areas.
- Larger facility setbacks from water features.

Highlights and Impacts:

- All studied states prohibit construction of production facilities on floodplains. Missouri is least restrictive (25-year versus 100-year for the other 3 states).
- All studied states except Missouri require that setbacks from public drinking water wells is greater for facilities than for land application activities.
- All studied states except Iowa restrict permitted operations in watersheds used for public drinking water supplies. Missouri excludes Class IA liquid handling systems in any drinking water watershed. Oklahoma requires any permitted facility to be at least 3 miles from a surface drinking water supply if they are in the same watershed. Indiana requires facilities be a least 1,000 feet from a surface water public water supply.
- Missouri and Oklahoma have special restrictions for other specified water resources.
- All studied states except Indiana have setbacks for facilities from residences and/or public use areas.
- In all studied states, setbacks are dependent on type of operation, size and type of manure storage. Maximum setbacks in Missouri and Iowa are 3000 feet, in Indiana is 1000 feet and in Oklahoma is 3 miles.
- Oklahoma is the only state with restrictions on the density of animal feeding operations. Permitted operations cannot be within 1 mile of 10 or more residences. Our local contacts in Oklahoma indicated that the current setback restrictions on poultry and swine operations have halted expansion of those sectors.

Each state has unique valuable resources, landscape and climate. Different standards among states can be anticipated based on these differences. Yet the differences among states and the size of some setbacks are difficult to rationalize based on water quality.

Facility setbacks from water resources can have a water quality benefit if they prevent movement of manure from the facility to the water resource. Liquid storage facilities have the potential for failure, leakage or seepage losses. However the concept that extensive setbacks (0.5 miles to 3 miles in most states) have a direct impact on water quality is doubtful. Such setbacks may not even prevent transport of leaks to a water resource if a tributary passes close to the storage providing a conduit for water transport. In contrast, Missouri’s elimination of large liquid handling
systems in sensitive watersheds could be construed as having a water quality basis because it eliminates all risk.

Other strategies such as secondary containment and more conservative engineering standards would likely be more effective at insuring water quality objectives than larger setbacks.

The benefit of large setbacks for dry handling storages has even less connection to water quality objectives since these materials do not have the capacity for spills. Setbacks for residences and public areas also have little demonstrable effect on water quality. Such standards may have a basis in reducing odor impacts on neighbors or fulfill zoning type objectives to prevent animal production businesses near residential or public areas.

Facility setbacks are an area of regulation that more than any other demonstrates the incorporation of objectives beyond water quality into our water quality regulations in Missouri and other states. Such distractions weaken the effectiveness of water quality regulations by imposing less effective strategies and confusing the rationale used to protect water quality.

Table 4.1.2-1. Comparison of selected states facility setback distances.

<table>
<thead>
<tr>
<th>State</th>
<th>Residential setback distances</th>
<th>Well setback distances</th>
<th>Water resource (streams, cisterns, surface water, etc.) setback distances</th>
<th>Property line setback distances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>0-3000 ft.</td>
<td>100-300 ft.</td>
<td>300 ft.</td>
<td>None</td>
</tr>
<tr>
<td>Iowa</td>
<td>0-3000 ft.</td>
<td>100-1000 ft.</td>
<td>500-2,500 ft.</td>
<td>0-100 ft.</td>
</tr>
<tr>
<td>Indiana</td>
<td>None</td>
<td>100-300 ft.</td>
<td>100-1,000 ft.</td>
<td>100 ft.</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>0-2 miles</td>
<td>0-3 miles</td>
<td>0-3 miles</td>
<td>None</td>
</tr>
</tbody>
</table>
Appendix 4.1.2: State-by-state summary

Missouri

Sources: RSMO 640.710, 10 CSR 20-6.300(5)(A), 10 CSR 23-3.010

In Missouri, all Class I concentrated animal feeding operations must maintain a buffer distance between the nearest animal containment building or waste holding basin and any existing public building or occupied residence. The public building or occupied residence is considered existing if it is being used prior to the start of the neighbor notice requirements or 30 days prior to a construction permit application, whichever is later. Table 4.1.2-2 illustrates the buffer distance requirements for non-owned, occupied residences or public buildings.

Table 4.1.2-2. Missouri separation distances for residences or public buildings.

<table>
<thead>
<tr>
<th>Size of Operation</th>
<th>Setback Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class IA (7,000 or more AUs)</td>
<td>3,000 ft.</td>
</tr>
<tr>
<td>Class IB (3,000 to 6,999 AUs)</td>
<td>2,000 ft.</td>
</tr>
<tr>
<td>Class IC (1,000 to 2,999 AUs)</td>
<td>1,000 ft.</td>
</tr>
<tr>
<td>Class II (300 to 999 AUs)</td>
<td>None unless part of a permit or letter of approval requirement</td>
</tr>
</tbody>
</table>

Additionally, confinement buildings and manure storage structures must have a 300 feet separation distance from wells or water supply structures. Dry poultry litter storage need be only 100 feet from wells or water supply structures. A farm pond will be considered a water supply structure if it is the source of domestic water for the farm. Manure storage structures must be located above the 25-year flood plain. Class IA CAFOs are prohibited from the identified watersheds of the Current, Jacks Fork and Eleven Point Rivers.

Iowa


Iowa has established separation distances that vary depending on the type of manure storage structure, operation size, and the type of area needing protection.
### Table 4.1.2-3. Iowa separation distances for confinement feeding operations by size.

<table>
<thead>
<tr>
<th>Type of Structure</th>
<th>Total Animal Unit Capacity</th>
<th>Residences, Businesses, Churches, Schools</th>
<th>Public Use Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Unincorporated Areas</td>
<td>Incorporated Areas</td>
</tr>
<tr>
<td>Anaerobic lagoons and uncovered earthen manure storage basins</td>
<td>500 or less</td>
<td>1,875 ft.</td>
<td>1,875 ft.</td>
</tr>
<tr>
<td></td>
<td>501 to 999</td>
<td>1,875 ft.</td>
<td>1,875 ft.</td>
</tr>
<tr>
<td></td>
<td>1,000 to 2,999</td>
<td>2,500 ft.</td>
<td>2,500 ft.</td>
</tr>
<tr>
<td></td>
<td>3,000 or more</td>
<td>3,000 ft.</td>
<td>3,000 ft.</td>
</tr>
<tr>
<td>Covered earthen manure storage basins</td>
<td>500 or less</td>
<td>1,250 ft.</td>
<td>1,875 ft.</td>
</tr>
<tr>
<td></td>
<td>501 to 999</td>
<td>1,250 ft.</td>
<td>1,875 ft.</td>
</tr>
<tr>
<td></td>
<td>1,000 to 2,999</td>
<td>1,875 ft.</td>
<td>2,500 ft.</td>
</tr>
<tr>
<td></td>
<td>3,000 or more</td>
<td>2,375 ft.</td>
<td>3,000 ft.</td>
</tr>
<tr>
<td>Uncovered formed manure storage structures</td>
<td>500 or less</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>501 to 999</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>1,000 to 2,999</td>
<td>2,000 ft.</td>
<td>2,500 ft.</td>
</tr>
<tr>
<td></td>
<td>3,000 or more</td>
<td>2,500 ft.</td>
<td>3,000 ft.</td>
</tr>
<tr>
<td>Confinement buildings and covered formed manure storage structures</td>
<td>500 or less</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>501 to 999</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>1,000 to 2,999</td>
<td>1,875 ft.</td>
<td>2,500 ft.</td>
</tr>
<tr>
<td></td>
<td>3,000 or more</td>
<td>2,375 ft.</td>
<td>3,000 ft.</td>
</tr>
<tr>
<td>Egg washwater storage structures</td>
<td>500 or less</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>501 to 999</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>1,000 to 2,999</td>
<td>1,500 ft.</td>
<td>2,000 ft.</td>
</tr>
<tr>
<td></td>
<td>3,000 or more</td>
<td>2,000 ft.</td>
<td>3,000 ft.</td>
</tr>
</tbody>
</table>

Well separation distances apply to all animal feeding operations, regardless of the size of the operation. The distances vary depending on the type of well and type of structure. A confinement feeding operation shall not be constructed on a 100-year floodplain.

### Table 4.1.2-4. Iowa separation distances for wells.

<table>
<thead>
<tr>
<th>Type of Structure</th>
<th>Public Well</th>
<th>Private Well</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shallow</td>
<td>Deep</td>
</tr>
<tr>
<td>Aerobic structure, anaerobic lagoon, earthen manure storage basin, egg washwater storage structure &amp; open feedlot runoff control basin</td>
<td>1,000 ft.</td>
<td>400 ft.</td>
</tr>
<tr>
<td>Formed manure storage structure, confinement building, open feedlot solids settling facility &amp; open feedlot</td>
<td>200 ft.</td>
<td>100 ft.</td>
</tr>
</tbody>
</table>

### Table 4.1.2-5. Iowa separation distances for confinement feeding operations.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Setback distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major water sources, wellhead, cistern of an agricultural drainage well or known sinkhole (Excluding farm ponds, privately owned lakes or when a secondary containment barrier is provided)</td>
<td>1,000 ft.</td>
</tr>
<tr>
<td>Water sources other than major water sources, surface intakes of an agricultural drainage well (Excluding farm ponds, privately owned lakes or when a secondary containment barrier is provided)</td>
<td>500 ft.</td>
</tr>
<tr>
<td>Designated wetlands (managed and owned by Iowa DNR or federal government)</td>
<td>2,500 ft.</td>
</tr>
<tr>
<td>Right-of-way of a public thoroughfare (road, street or bridge) constructed or maintained by the state or a political subdivision (Excluding small confinement feeding operations (&lt;500 AU))</td>
<td>100 ft.</td>
</tr>
</tbody>
</table>
Indiana

Sources: 327 IAC 16-8-2, IDEM CFO Guidance Manual (2002), 327 IAC 16-8-1(3)

Waste management systems must be located to maintain minimum setback distances from features that are known and identifiable at the time the application is submitted.

Table 4.1.2-6. Indiana separation distances for waste management systems.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Liquid Manure</th>
<th>Solid Manure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface waters of the state</td>
<td>300 ft.</td>
<td>100 ft.</td>
</tr>
<tr>
<td>Drainage inlets, including water and sediment control basins</td>
<td>300 ft.</td>
<td>100 ft.</td>
</tr>
<tr>
<td>Sinkholes</td>
<td>300 ft.</td>
<td>100 ft.</td>
</tr>
<tr>
<td>Off-site water wells</td>
<td>300 ft.</td>
<td>100 ft.</td>
</tr>
<tr>
<td>On-site water wells</td>
<td>100 ft.</td>
<td>100 ft.</td>
</tr>
<tr>
<td>Property lines</td>
<td>100 ft.</td>
<td>100 ft.</td>
</tr>
<tr>
<td>Public roads</td>
<td>100 ft.</td>
<td>100 ft.</td>
</tr>
<tr>
<td>Public water supply well or public water supply surface intake</td>
<td>1000 ft.</td>
<td>1000 ft.</td>
</tr>
</tbody>
</table>

If one of the features in the table above were constructed within the required setback distance not in the control of the owner/operator and after the application was submitted, a different setback distance would apply. If a new waste management system is built, it would be required to be no closer than the distance between the new feature and the original confined feeding operation.

If deemed necessary to protect human health or the environment, IDEM may require setback distances to residences or public buildings. An owner/operator may also obtain a reduced setback distances by demonstrating the use of innovative technology that meets performance standards.

New waste storage systems must not be constructed in a 100-year floodplain, unless all waste storage system access is at least 2 feet above the 100-year floodplain.

Oklahoma


Oklahoma rules on facility setbacks that have been enacted differ depending on species and size. The setback distances for production structures are divided into three categories; poultry operations, licensed managed feeding operations (LMFO) and concentrated animal feeding operation (CAFO). The categories are not independent of each other and an operation is required to follow the strictest requirement. In no event shall a waste storage structure be located within the 100-
year floodplain as established by the Federal Emergency Management Agency (FEMA).

Poultry Operation Setbacks
No new or expanding poultry feeding operations shall be constructed within a 100-year floodplain.

Table 4.1.2-7. Oklahoma poultry operation required separation distances.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>High water mark of a surface public water supply if operation is within the same watershed</td>
<td>1 1/2 miles</td>
</tr>
<tr>
<td>Designated scenic river area specified by the Scenic Rivers Act</td>
<td>1 mile</td>
</tr>
<tr>
<td>Public drinking water well</td>
<td>1 mile</td>
</tr>
<tr>
<td>Outstanding resource water that has recreational or ecological significance by most current Water Quality Standards</td>
<td>1 mile</td>
</tr>
</tbody>
</table>

LMFO Setbacks
LMFO operations can be defined as an animal feeding operation primarily using a liquid animal waste management system, where animals are primarily housed in a roof-covered structure and which confines more than the number of animals specified in any of the following categories:
- 2,500 swine >55 lbs.;
- 10,000 swine <55 lbs.;
- 100,000 laying hens or broilers, if the facility has continuous overflow watering;
- 30,000 laying hens or broilers, if the facility has a liquid manure system; or
- Any combination of swine weighing over 55 lbs. or under 55 lbs. which would equal 1,000 animal units.

The setbacks found in Table 4.1.2-8 would apply to all LMFO operations applying for a new or expanding CAFO license. These operations have the following table setback requirements apply.

Table 4.1.2-8. Oklahoma LMFO separation distances.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designated scenic river area specified by the Scenic Rivers Act</td>
<td>3 miles</td>
</tr>
<tr>
<td>Boundary of any historic property or museum owned by state</td>
<td>3 miles</td>
</tr>
<tr>
<td>Public drinking water well</td>
<td>3 miles</td>
</tr>
<tr>
<td>Private drinking water well</td>
<td>300 ft.</td>
</tr>
<tr>
<td>Outstanding resource water that has recreational or ecological significance by most current Water Quality Standards</td>
<td>1 mile</td>
</tr>
<tr>
<td>National park designated by U.S. National Park Service</td>
<td>3 miles</td>
</tr>
<tr>
<td>Area or facility owned or operated as a camp or recreational site by a non-profit organization (Shall not apply if written waiver is obtained)</td>
<td>3 miles</td>
</tr>
</tbody>
</table>

Animal feeding operations that use liquid waste management systems where swine are housed in roof covered structures shall not be located within the following distances from an occupied residence. These setback requirements shall not apply to an owner or operator if a written waiver is obtained.
Table 4.1.2-9. Oklahoma separation distances for swine operations.

<table>
<thead>
<tr>
<th>Operation Size</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 4,000 AUs</td>
<td>2 miles</td>
</tr>
<tr>
<td>2001 to 4,000 AUs</td>
<td>1¼ miles</td>
</tr>
<tr>
<td>1001 to 2,000 AUs</td>
<td>¾ mile</td>
</tr>
<tr>
<td>601 to 1,000 AUs</td>
<td>½ mile</td>
</tr>
<tr>
<td>300 to 600 AUs</td>
<td>¼ mile</td>
</tr>
<tr>
<td>&lt; 300 AUs</td>
<td>No setback</td>
</tr>
</tbody>
</table>

CAFO Setbacks
A CAFO is an animal feeding operation that is a LMFO, greater than 1000 animal units, or 300 animal units that discharges into waters of the state. CAFO operations must have the following setback distances found in Table 4.1.2-10.

Table 4.1.2-10. Oklahoma separation distances for CAFOS.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 or more occupied residences (Shall not apply if written waiver by applicable property owner is obtained)</td>
<td>1 mile</td>
</tr>
<tr>
<td>Private or public drinking water well (from waste water retention structures)</td>
<td>300 ft.</td>
</tr>
<tr>
<td>State park or resort</td>
<td>3 miles</td>
</tr>
<tr>
<td>Incorporated limits of any municipality</td>
<td>3 miles</td>
</tr>
<tr>
<td>High water mark of a surface public water supply if the CAFO is located within the drainage basin for the public water supply</td>
<td>3 miles</td>
</tr>
</tbody>
</table>

New or expanded point source discharges (CAFOs) shall be prohibited in any watershed designated as or containing:
- Outstanding Resource Waters;
- Sensitive Private and Public Water Supplies; or
- High Quality Waters.
Missouri’s manure storage design standards would benefit from reorganization and updating to make them more accessible and less confusing.

The following are recommendations for improvements to Missouri’s manure storage system design requirements and are discussed in greater detail within the text of this section.

**Recommendations:**

- For solid manure storage systems, encourage the use of covers to prevent storm water from coming into contact with the stored manure. If solid manure storage structures are not covered, the structures should be constructed such that any liquid runoff is collected and managed in a liquid manure system.

- Review and update the information contained in *Manual 121: Design Guidelines for Animal Waste Management for Concentrated Animal Feeding Operations*, 1989. Although this is a procedural recommendation, it is necessary in order to ensure accurate conveyance of proper design standards for manure storage facilities.

- Move the waste system regulations for animal feeding operations into the same chapter with the other animal feeding operation regulations to avoid confusion and clarify regulations.

- A barrel test or other test to document seepage rate should not be required on a lagoon that is inspected and certified by a professional engineer to be properly constructed. Tests should be conducted if there is reason to suspect seepage rates in excess of the allowable seepage rate.

- Missouri should develop guidelines for siting and structural requirements for dry manure storage facilities to minimize losses of nutrients from dry manure to ground and surface waters. Missouri should develop recommendations for dry manure storage structures and make them easily accessible through inclusion in an updated *Manual 121: Design Guidelines for Animal Waste Management for Concentrated Animal Feeding Operations*, 1989.

- Manure storage volume (and length of storage period) should be based on accessibility to land application sites and not on the type or consistency of the manure. Missouri should encourage design of manure storage structures with sufficient volume to promote manure applications that optimize crop utilization of nutrients and reduce nutrient loss potential.
Highlights and Impacts:
- The overall manure storage requirements between the compared states reveal some small differences; however, most requirements would not greatly affect the overall economics of animal production.
- Some differences in bottom of storage separation distances to groundwater exist but appear to be dependent on the local soil and geology.

4.2.1 Storage Period Requirements

Recommendations:
Manure storage volume (and length of storage period) should be based on accessibility to land application sites and not on the type or consistency of the manure. Missouri should encourage design of manure storage structures with sufficient volume to promote manure applications that optimize crop utilization of nutrients and reduce nutrient loss potential.

Highlights and Impacts:
- Iowa, Indiana and Oklahoma all require at least 180 days of manure storage. For earthen manure storage basins, Iowa requires 365 days of storage.
- Missouri currently recommends a manure storage period based on the type of manure storage: liquid basin, anaerobic lagoon, or solid manure.

Manure storage volume must be available when needed for the storage to play its water protection role. If a manure storage structure is designed for 365 days of storage, it is necessary to remove manure at least once during that 365-day storage period to allow for additional collection of manure. Likewise, a structure that contains sufficient volume for 90 days of storage is viable if manure can be removed from the structure every 90 days. Management of the manure storage structure and coordination of the storage period with the accessibility to land application sites should be the factors that determine the required length of manure storage period. Manure storage structures that store rainfall and runoff will require manure removal and land application on a more frequent time schedule when actual rainfall exceeds design rainfall amounts.

Table 4.2.1-1. Comparison of state manure storage period requirements

<table>
<thead>
<tr>
<th>State</th>
<th>Storage Structure</th>
<th>Manure Storage Time Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>Liquid Manure Basin</td>
<td>180 days recommended</td>
</tr>
<tr>
<td></td>
<td>Anaerobic Lagoon</td>
<td>365 days recommended</td>
</tr>
<tr>
<td></td>
<td>Solid Manure</td>
<td>90 days recommended</td>
</tr>
<tr>
<td>Iowa</td>
<td>Earthen Waste Slurry Basin</td>
<td>180 days</td>
</tr>
<tr>
<td></td>
<td>Earthen Manure Storage Basin</td>
<td>365 days</td>
</tr>
<tr>
<td></td>
<td>Anaerobic Lagoons</td>
<td>Not to exceed 14 months manure storage</td>
</tr>
<tr>
<td>Indiana</td>
<td>All new manure storages</td>
<td>180 days minimum</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>All manure storages</td>
<td>180 days minimum</td>
</tr>
</tbody>
</table>
Appendix 4.2.1: State-by-state summary

No additional information is included for Missouri, Iowa, and Oklahoma.

Missouri


Iowa

Source: IAC 567-65.15(4, 5, 13)

Indiana

Source: 327 IAC 16-8-4

All new manure storage structures must be designed, constructed, and maintained with a combined storage capacity of at least 180 days storage for:

- Manure;
- Bedding, if applicable;
- Net average rainfall; and
- Expected run-off and rainfall from 25-year, 24-hour precipitation event that falls on the drainage area around the liquid manure storage structure but not to include rain and run-off from 25-year, 24-hour precipitation event that falls directly on the liquid manure storage structures, if applicable

Oklahoma

Source: OAC 35:17-3-11 (B)(v)
4.2.2 Formed Manure Storage Design and Construction

Recommendations:
Missouri’s formed manure storage design requirements are acceptable and no recommendations are being made for revision of these standards at this time.

Highlights and Impacts:
The states in this study do not appear to have significantly different design requirements for formed manure storage structures.

Missouri, like the other states in the study, requires that a professional engineer approve the design of the formed manure storage structure and that accepted concrete design standards be followed.

Table 4.2.2-1. Comparison of storage design and construction specifications for formed manure storage structures

<table>
<thead>
<tr>
<th>State</th>
<th>Formed Manure Storage Specifications</th>
<th>Design Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>Not found in regulations</td>
<td>PE design, based on accepted concrete design standards</td>
</tr>
<tr>
<td>Iowa</td>
<td>Extensive detail in regulations</td>
<td>PE design or conform to MWPS design with extensive concrete standards printed in the regulations</td>
</tr>
<tr>
<td>Indiana</td>
<td>Simple details in regulations</td>
<td>Appear to be based on accepted concrete design standards</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>Not in found in regulations</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
Appendix 4.2.2: State-by-state summary

Missouri

Missouri does not have design specifications for formed manure storages printed in regulations. Permitting requirements are that these formed manure storages must be designed by a professional engineer. Designs must conform to design criteria as printed by the American Concrete Institute (ACI), Natural Resource Conservation Service (NRCS) Design Specifications, Midwest Plan Service (MWPS) or other accepted concrete design standards.

Iowa

Sources: IAC 567-65.15(14), IAC 567-65.15(1-3)

Iowa has extensive concrete specifications for formed manure storage structures printed in regulation. These specifications seem to be founded in design criteria from the American Concrete Institute (ACI), Natural Resource Conservation Service (NRCS) Design Specifications, Midwest Plan Service (MWPS), Portland Cement Association and other accepted concrete design standards.

Indiana

Sources: 327 IAC 16-8-6, Indiana CFO Guidance Manual (2002)

- A minimum of two test holes must be used to determine soil and water table information. The holes must be at least two feet deep below the lowest point of the manure storage structure.
- New concrete storage structures for liquid manure must be designed to be structurally sound through:
  1. A concrete mixture that is well-proportioned and consolidated;
  2. Minimized cracking;
  3. Joints that are properly spaced, sized, designed and constructed;
  4. Adequate reinforcement steel;
  5. A foundation that provides necessary support; and
  6. Use of water stops.

Oklahoma

No design and construction specifications for formed manure storages are printed in the state regulations.
4.2.3 Earthen (Unformed) Manure Storage Design and Construction

**Recommendations:**
Missouri’s storm water containment requirements are acceptable and no recommendations are being made for revision of these standards at this time.

**Highlights and Impacts:**
- Iowa, Indiana, and Oklahoma require, at a minimum, that the 25-year, 24-hour storm event be contained in manure storage structures.
- Missouri requires that concentrated animal feeding operations utilizing wet manure handling systems contain a 25-year, 24-hour design storm as well as a 10-year, 10-day storm.

Missouri’s requirement may be viewed as somewhat more stringent than the requirements of the other states in this study; however, the actual cost of achieving this additional storage requirement is minimal. The additional storage volume maintained with the 10-year, 10-day storm requirement provides greater water quality protection by providing storage volume to accommodate chronic storm events.

**Table 4.2.3-1 Comparison of manure storage structure runoff, rainfall minus evaporation, and freeboard**

<table>
<thead>
<tr>
<th>State</th>
<th>Facility Type</th>
<th>Storm Water Containment Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>CAFO w/ wet handling system</td>
<td>• Design storm event can be the 25-year, 24-hour storm; the 10-year, 10-day storm; the 10-year, 365-day rainfall, or 365-day rainfall minus evaporation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Minimum 1-foot depth on the surface of the storage required to provide for storage of the catastrophic rainfall event</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Minimum 1-foot freeboard above the emergency spillway required</td>
</tr>
<tr>
<td>Iowa</td>
<td>Unformed manure storage structure</td>
<td>• Confined feeding operations (animals under roof) must have a minimum level of manure control to ensure retention between periods of land application</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Open feedlots require a minimum level of manure retention from a 25-year, 24-hour precipitation event</td>
</tr>
<tr>
<td>Indiana</td>
<td>CFO, new waste storage system for liquid or solid manure</td>
<td>• 25-year, 24-hour precipitation event for drainage area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Minimum of 2-foot of freeboard is required to allow for storage of the direct rainfall on the manure storage surface</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>LMFO</td>
<td>• 25-year, 24-hour precipitation event plus a 21-day volume of flow to the retention storage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Freeboard is to be 1-foot below the spillway or outlet</td>
</tr>
</tbody>
</table>
Appendix 4.2.3: State-by-state summary

Missouri


Freeboard, storage, and load requirements for CAFOs with wet handling systems specifies that the top of the berm must be at least 2 feet above the maximum depth of the lagoon.

Iowa

Sources: IAC 567-65.2(3)b, IAC 567-65.15(13)

- For confinement feeding operations, manure stored from earthen waste slurry storage basins and unfurmed manure storage structures shall be removed from structures to maintain a minimum of 2 feet. For unroofed formed structures, a minimum of 1 foot is required. Greater level of freeboard may be required for structural integrity or manure overflow prevention.
- Anaerobic lagoons must be loaded with manure and dilution water at least once per week.
- Prior to the discharge of any manure to the anaerobic lagoon, the lagoon shall be filled to a minimum of 50 percent of its minimum stabilization volume with fresh water.
- Total anaerobic lagoon volume is determined by summing the minimum stabilization volume, minimum dilution volume (not less than 50% of minimum stabilization volume), manure storage between storage periods and storage for 8 inches of precipitation.
- For all animal species other than beef cattle, there shall be a 1,000 cubic feet minimum design volume for each 5 pounds of volatile solids produced per day if the volatile solids produced per day are 6,000 pounds or less and for each 4 pounds if the volatile solids produced per day are more than 6,000 pounds. For beef cattle, there shall be 1,000 cubic feet minimum design volume for each 10 pounds of volatile solids produced per day.
- In selected counties, for all animal species other than beef cattle, there shall be a 1,000 cubic feet minimum design volume for each 4.5 pounds of volatile solids produced per day if the volatile solids produced per day are 6,000 pounds or less. However, if a water analysis indicates the sulfate level is below 500 milligrams per liter, then the rate is 1,000 cubic feet for each 5.0 of volatile solids per day.
- Credit shall be given for removal of volatile solids from the manure stream prior to discharge to the lagoon.
- Credit shall be given for mechanical aeration if the upper 1/3 of the lagoon volume is mixed by the mechanical aeration and if at least 50% of the oxygen requirement of the manure is supplied by the aeration equipment.
• American Society of Agricultural Engineers (ASAE) standards, “Manure Production and Characteristics,” D384.1 or MWPS-18, Table 2.1, shall be used in determining the BOD5 production and volatile solid production of various animal species.

• Lagoon manure and water management
  1. For single lagoons or lagoons without site-specific lagoon operation plan: the total volume of fresh water for dilution added to the lagoon annually shall equal ½ the minimum stabilization volume. At all times, the amount of fresh water added to the lagoon shall equal or exceed the amount of manure discharged by the lagoon.
  2. Two or three cell lagoon: a lagoon operation plan must be approved by DNR.

Indiana

Sources: 327 IAC 16-8-4, 327 IAC 16-8-5

• For any uncovered new liquid manure storage structure, the design must include at minimum of 2 feet of freeboard to include the expected rainfall from a 25-year, 24-hour precipitation event that falls directly on the liquid manure storage structure.

• All new manure storage structures must be designed, constructed, and maintained with a combined storage capacity of at least 180 days storage for:
  1. Manure;
  2. If applicable, bedding;
  3. Net average rainfall; and
  4. If applicable, expected run-off and rainfall from 25-year, 24-hour precipitation event that falls on the drainage area around the liquid manure storage structure but not to include rain and run-off from 25-year, 24-hour precipitation event that falls directly on the liquid manure storage structures

Oklahoma

Sources: OAC 35:17-3-11(e)(5)(C)(ii), OAC 35:17-3-11(e)(5)(B), 58 FR 7610

Prior to the submission of a CAFO license application, each facility shall develop a Pollution Prevention Plan and are required to the following freeboard, storage and loading requirements:

• Documentation of retention structure capacity shall be submitted to the Department and shall be based upon input parameters, the assumptions and actual calculations, showing volumes for all intermediate steps, used in determining the appropriate volume capacity. All waste retention structures for LMFOs shall be designed for the maximum number of animals that are or will be licensed at the facility. Retention structure capacity shall be based upon the following, at a minimum:
  1. The runoff volume from open lot surfaces;
  2. The runoff volume from areas between open lot surfaces and the retention structure;
3. The rainfall multiplied by the area of the retention structure;
4. The volume of rainfall from any roofed area that is directed into the retention structure;
5. All waste and process generated wastewater produced during a period of time not less than 21 days, including: volume of wet manure that enters a pond; plus volume of water used for manure or waste removal; plus volume of wash or cleanup water; plus other water, including drinking water that enters the retention structure. All waste retention structures designed for LMFOs shall have a capacity for all waste and process generated wastewater produced during a period of time not less than 180 days;
6. Volume of a 25-year, 24-hour rainfall event; and
7. One foot of freeboard below spillway or outlet.

- If retention structures are constructed with an emergency spillway, a minimum of one foot of freeboard shall be maintained between the top of the 25-year, 24-hour storm volume and the bottom of the emergency spillway.
- For an operation applying for an Oklahoma General Permit, the retention capacity shall be based upon the 25-year, 24-hour rainfall event and the facility design should include a top freeboard of two feet and in no case less than one foot.
4.2.4 Compaction/Liner Requirements

Recommendations:

A barrel test or other test to document seepage rate should not be required on a lagoon that is inspected and certified by a professional engineer to be properly constructed. Tests should be conducted if there is reason to suspect seepage rates in excess of the allowable seepage rate.

Highlights and Impacts:

• Iowa, Indiana may require liners, monitoring systems, higher compaction, innovative technology or leachate detection if deemed necessary to protect the environment.
• Oklahoma requires that a professional engineer, SCS engineer, or qualified groundwater scientist review the pollution prevention plan and perform a site evaluation every five years.
• Oklahoma also requires that all licensed managed feeding operations (LMFOs) install a leak detection system or monitoring wells.
• In Oklahoma, general permit holders who cannot document that no significant hydrologic connection to ground water exists must utilize a liner for ponds, lagoons, and basins of retention facilities to prevent the potential contamination of ground waters.
• Missouri allows different liner seepage rates based on the contamination risk of potable water.
• Missouri requires a barrel test to monitor lagoon for leakage and requires notification of Missouri Department of Natural Resources at least seven days prior to beginning the test to allow regulatory observation of the test.

Missouri requires certification and inspection of the lagoon seal by a professional engineer. Additionally, after a lagoon liner has been inspected and certified by a professional engineer as being properly constructed, Missouri still requires a barrel test to monitor the seepage rate of the clay liner.

Proper construction of lagoon liners is necessary to maintain water quality protection. To ensure proper construction specifications are achieved, a professional engineer or other qualified individual should monitor the process of constructing the liner and certify the completed structure. In instances where acceptable compaction requirements cannot be achieved with earthen liners, the use of synthetic products should be considered to aid in achieving the desired seepage control for the structure.
Table 4.2.4-1. Comparison of storage design and construction specifications for unformed manure storage structures.

<table>
<thead>
<tr>
<th>State</th>
<th>Facility Type</th>
<th>Liner Materials Allowed</th>
<th>Liner Permeability</th>
<th>Additional Requirements</th>
</tr>
</thead>
</table>
| Missouri | CAFO w/ wet handling system                 | Soil, asphalt, soil cement, synthetic liner; bentonite, soda ash or other sealers may be used w/ soil liners | 500 gal/ac/day if risk of potable water contamination; 3500 gal/ac/day otherwise | Class IA CAFOs (≥ 7000 AU) must:  
  • have engineer inspect and certify lagoon seal and compaction  
  • barrel test lagoon for leakage  
  • notify MDNR ≥ 7 days prior to compaction and barrel test dates to allow observation of tests |
| Iowa    | Unformed manure storage structure           | Soil, soil combinations or other similar materials, synthetic liner                      | 1/16 in per day                                | Following construction of the lagoon or basin, the results of a testing program which indicates the adequacy of the seal shall be provided to DNR. |
| Indiana | CFO, new waste storage system for liquid or solid manure | No specifications defined in the regulations                                             | 1/16 in per day                                | Liners, monitoring systems, higher compaction, innovative technology or leachate detection may be required if deemed necessary to protect the environment.  
  • A minimum of two test holes must be used to determine soil and water table information.  
  • The holes must be at least five feet deep below the lowest point of the manure storage structure.  
  • Designs must be certified by a PE in Indiana. |
| Oklahoma | LMFO                                       | Soil, synthetic liners; bentonite clay may be used with soil liners                      | 0.83 ft per year                               | Document liner maintenance in the Pollution Prevention Plan  
  • Have a SCS engineer, PE, or qualified groundwater scientist review the PPP and do a site evaluation every 5 years  
  All LMFO owners shall install a leak detection system or monitoring wells. |

Table 4.2.4-2. Comparison of allowable seepage rates among states

<table>
<thead>
<tr>
<th>State</th>
<th>Condition</th>
<th>Allowable Seepage Rate, in/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>Potable water contamination risk</td>
<td>0.0184</td>
</tr>
<tr>
<td></td>
<td>No potable water contamination risk</td>
<td>0.1286</td>
</tr>
<tr>
<td>Iowa</td>
<td>-----</td>
<td>0.0625</td>
</tr>
<tr>
<td>Indiana</td>
<td>-----</td>
<td>0.0625</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>-----</td>
<td>0.0273</td>
</tr>
</tbody>
</table>
Appendix 4.2.4: State-by-state summary

Missouri


Liner requirements for CAFOs with wet handling systems are as follows:
- The liner must be constructed with soils, asphalt, soil cement, or synthetic liners. For soil liners, bentonite, soda ash, or other sealing aids may be used to achieve adequate seal.
- All earthen liquid manure storage structures must be sealed so that seepage loss is as low as possible. Soils having a permeability coefficient of $10^{-7}$ cm/sec are acceptable. Design permeability of the pond seal shall not exceed 500 gallons per acre per day where potable groundwater might become contaminated. Rates of 3,500 gallons per acre per day are allowed for areas where contamination is not a problem.
- Class IA CAFOs with wet handling systems have the following requirements in regulations.
  1. The owner/operator must retain the services of a full-time resident engineer during lagoon seal construction and compaction tests for inspection and certification.
  2. Barrel tests to determine lagoon leakage rates on all new lagoons not having yet received operating permits.
  3. MDNR must be notified at least seven days prior to the compaction and barrel testing dates to allow observation of the tests.

Iowa

Source: IAC 567-65.15(11-12)

A lagoon or basin shall be sealed such that seepage loss through the seal is low as possible. The percolation rate shall not exceed 1/16 inch per day at the design depth of the lagoon or basin. Following construction of the lagoon or basin, the results of a testing program which indicates the adequacy of the seal shall be provided to DNR.

Aerobic structure, anaerobic lagoon, or earthen manure storage basin shall comply with the minimum standards:
- If the location contains suitable materials determined by soil corings, those material shall be compacted to establish a minimum 12-inch liner. A minimum initial over-excavation of 6 inches shall be required. The underlying material shall be scarified, reworked and compacted to a depth of 6 inches. The over-excavated materials shall be replaced and compacted.
- If the location does not contain suitable materials determined by soil corings, those materials shall be compacted to establish a minimum 24-inch liner.
• Suitable materials mean soil, soil combinations or other similar material that is capable of meeting the permeability and compaction requirements.
• A synthetic liner may be used.

Indiana

Sources: 327 IAC 16-7-2, 327 IAC 16-8-1, IDEM CFO Guidance Manual (2002), 327 IAC 16-8-3

For all confined feeding operations (CFO), new waste storage systems for liquid or solid manure must not be constructed in the following:

• Karst Terrain (some exceptions may apply);
• Floodway;
• 100-year flood plain, unless all waste management system access is at least 2 feet above the 100-year flood plain;
• Over mines (some exceptions may apply); or
• Soil that is expected to be in the seasonal high water table, unless the water table is lowered to keep it below the bottom of the waste storage structure.

IDEM may approve a new waste management system in karst terrain or over mines if the following site-specific information is submitted:

• For earthen manure storage structures for liquid manure, information from test holes at least five feet below the lowest point, except with karst topography where holes must go 10 feet deep or to the bedrock, whichever is shallower;
• Characterization of the seasonal water table and soil;
• Design specifications indicating adequate structural integrity and environmental protection; and
• Other information that IDEM deems necessary to ensure protection of human health and the environment.

Other information about other siting and design requirements.

• Soil and water table information from test holes for proposed liquid storage structures must be conducted by soil scientist, professional geologist, or professional engineer.
• If not in karst terrain, the base of the manure storage structure must be at least 2 feet above bedrock. If in karst terrain, IDEM will make the determination.
• Any drainage system to lower a seasonal water table around the base of a waste management system must be equipped with an access point for sampling.

IDEM may require additional standards to protect human health or the environment in highly permeable soils, in areas with a high water table, on steep slopes, in proximity to bedrock or in sensitive areas. Some of the additional requirements may include liners, monitoring system, higher compaction, innovative technology or other protective measures.
Soil liners shall be constructed to meet the following minimum requirements.

- Constructed in lifts or layers no more than six (6) inches thick when compacted.
  1. Soils used in the liner shall be free of foreign material, including trash, brush, and fallen trees.
  2. All side slopes and the floor of the retention structures shall be checked to ensure proper compaction and moisture content. All readings shall be recorded and properly documented.
- Compaction to ninety-five percent (95%) of Standard Proctor (ASTM D-698) at optimum moisture content.
- Hydraulic conductivities of no greater than $1 \times 10^{-7}$ cm/sec. The field permeability of the liner shall be verified by using one of the following methods:
  1. If a sealed Double Ring Infiltrometer is used to determine the field permeability of the liner, at least one representative location on each corner and one location in the center of the waste retention structure bottom shall be selected for Double Ring Infiltrometer determination.
  2. At least four (4) representative undisturbed core samples, one from each corner of the waste retention structure bottom shall be retrieved for permeability determination in the laboratory. The permeability shall be determined using a Flexible Wall Permeameter.
- Minimum thickness of one and one half (1.5) feet.
- Maximum hydrostatic head of ten and one half (10.5) feet.
- Hydrostatic head or water depth may be increased above ten and one half (10.5) feet in one of the following circumstances:
  1. Liner thickness above the minimum shall be increased by an amount needed to maintain the allowable seepage rate, which shall not exceed eighty three one hundredths (0.83) feet per year pursuant to Darcy's Velocity.
  2. Soils with permeabilities less than $1 \times 10^{-7}$ cm/sec are used to maintain the allowable seepage rate, which shall not exceed eighty three one hundredths (0.83) feet per year pursuant to Darcy's Velocity. Soils which do not meet the maximum criteria of $1 \times 10^{-7}$ cm/sec can be mixed with a sufficient amount of bentonite clay to achieve the desired standard.
  3. Any combination of (1) or (2). In no case shall hydraulic conductivity be used to reduce the minimum thickness of one and one half (1.5) feet or shall thickness be used to increase the maximum hydraulic conductivity of $1 \times 10^{-7}$ cm/sec.

Other requirements for liners are as follows:

- For an Oklahoma general permit, where the permittee cannot document that no significant hydrologic connection through ground water exists, the ponds, lagoons and basins of the retention facilities must have a liner which will prevent the potential contamination of surface waters.
- For an Oklahoma general permit, where a liner is installed to prevent hydrologic connection, the permittee must maintain the liner to inhibit infiltration of
wastewaters. Liners shall be protected from animals by fences or other protective devices. No trees shall be allowed to grow within the potential distance of the root zone. Any mechanical or structural damage to the liner will be evaluated by a Soil Conservation Service engineer, professional engineer, or qualified groundwater scientist within 30 days of the damage. Documentation of liner maintenance shall be kept with the pollution prevention plan. The permittee shall have a Soil Conservation Service engineer, professional engineer, or qualified groundwater scientist review the documentation and do a site evaluation every five years.

- For an Oklahoma general permit, site-specific conditions should be considered in the design and construction of liners. Soil Conservation Service liner requirements or liners constructed and maintained in accordance with Soil Conservation Service design specifications in Technical Note 716 (or its current equivalent) shall be considered to prevent hydrologic connection which could result in the contamination of surface waters. Liners for retention structures should be constructed in accordance with good engineering practices. Where no site-specific assessment has been done by a Soil Conservation Service, professional engineer, or qualified groundwater scientist the liner shall be constructed to have hydraulic conductivities no greater than $1 \times 10^{-7}$ cm/sec, with a thickness of 1.5 feet or greater or its equivalency in other materials.

- The owner shall maintain the liner to inhibit infiltration of wastewaters. Liners shall be protected from burrowing and other animals by fences or other protective devices. Liners shall also be protected from the potential root zone of all trees.

- Any mechanical or structural damage to the liner shall be evaluated by an environmental, agricultural, or other department approved professional engineer registered in the state of Oklahoma within thirty calendar days of the damage. Documentation of liner maintenance shall be kept with the pollution prevention plan.

- USDA NRCS Agricultural Waste Management Field Handbook Chapter 10 Appendix D shall only be used when an NRCS Engineer designs the retention structures.

- Flexible membrane or synthetic liners may be used in connection with a soil liner or as a substitute for a soil liner. Geosynthetic liners and flexible membrane liners shall be installed so as to protect waters of the state from contamination.

- All owners of LMFOs shall install a leak detection system or monitoring wells.
### 4.2.5 Site Preparation Requirements

#### Recommendations:

Missouri’s earthen manure storage structure site preparation requirements are acceptable and no recommendations are being made for revision of these standards at this time.

#### Highlights and Impacts:

- Missouri and Iowa have a similar recommendation of four feet of separation between the earthen manure storage structure and the groundwater table.
- Iowa will allow a smaller separation distance, but requires a synthetic liner if the groundwater table is less than two feet below the top of the earthen manure storage basin liner.
- Oklahoma requires a separation of ten feet between the bottom of a waste retention structure and the highest groundwater elevation.
- In Missouri, a geological investigation must be performed by the MDNR Division of Geology and Land Survey and an earthen manure storage structure may not be constructed where the geologic report rates the “collapse potential” as severe.

Distinctions in separation distances between earthen manure storage structures and groundwater among the states are expected due to differences in geological formations among the states.

#### Table 4.2.5-1. Comparison of state requirements for separation distance between manure storage structure and groundwater.

<table>
<thead>
<tr>
<th>State</th>
<th>Facility Type</th>
<th>Separation Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>CAFO with wet handling system</td>
<td>4’ separation between bottom of pond and maximum groundwater elevation where feasible</td>
</tr>
<tr>
<td>Iowa</td>
<td>Unformed manure storage structure</td>
<td>4’ separation between top of liner and groundwater table; a synthetic liner is required if the groundwater table is less than 2’ below the top of the liner</td>
</tr>
<tr>
<td>Indiana</td>
<td>CFO, new waste storage system for liquid or solid manure</td>
<td>System must not be constructed in soil that is expected to be in the seasonal high water table unless the water table is lowered to keep it below the bottom of the waste storage structure; IDEM may require additional standards to protect human health or the environment in areas with highly permeable soils or areas with a high water table</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>LMFO</td>
<td>Minimum of 10’ separation between bottom of waste retention structure and highest annual or seasonal level of groundwater elevation, including the perched water table and regional water table or aquifer</td>
</tr>
</tbody>
</table>
Table 4.2.5-2. Comparison of additional state requirements for manure storage structure site preparation.

<table>
<thead>
<tr>
<th>State</th>
<th>Facility Type</th>
<th>Site/Preparation Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>CAFO with wet handling system</td>
<td>A geological investigation must be prepared by MDNR, Division of Geology and Land Survey</td>
</tr>
<tr>
<td>Iowa</td>
<td>Unformed manure storage structure</td>
<td>4’ separation between bottom of structure and bedrock</td>
</tr>
<tr>
<td>Indiana</td>
<td>CFO, new waste storage system for liquid or solid manure</td>
<td>2’ separation between base of structure and bedrock; Structure must not be constructed in Karst terrain or mines unless site-specific information is submitted in some cases</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>LMFO</td>
<td>Description of geologic information is required; new facilities shall not be built in a water of the U.S.</td>
</tr>
</tbody>
</table>
Appendix 4.2.5: State-by-state summary

**Missouri**


A concentrated animal feeding operation (CAFO) in the state of Missouri has the following siting requirements apply in regulations:

- A CAFO with a wet handling system must have a minimum separation of 4 feet between the bottom of the pond and the maximum groundwater elevation where feasible;
- A CAFO with a wet handling system must have a geological investigation prepared by MDNR, Division of Geology and Land Survey; and
- Earthen manure storage structures are not acceptable where the geologic report rating is severe for "collapse potential."

**Iowa**

Sources: IAC 567-65.15(19), IAC 567-65.8(3)d., IAC 567-65.15(7-10), IAC 567-65.15(14), IAC 567-65.15(1-3)

An animal feeding operation in the state of Iowa has the following siting requirements apply in regulations.

- A confined feeding operation may not construct on land with alluvial soils unless DNR determines proposed location is not on 100-year floodplain. A CFO should not be constructed in 100-year floodplain. If other types of animal feeding operations (open feedlots) are located in a 100-year floodplain, they must meet requirements found in Iowa Administrative Code 567 chapters 70 to 76.
- Four feet is the recommended separation between top of the liner and groundwater table. In no case shall the top of the liner be below the water table. If groundwater table is less than 2 feet below top of liner, a synthetic liner must be used.
- A minimum of four feet of separation between an unformed manure storage structure bottom and any bedrock formation is required. A ten foot separation is recommended. A synthetic liner shall be required if the unformed structure is to located less than 10 feet above a carbonate or limestone formation.
- An anaerobic lagoon or earthen manure storage basin shall not be located on a site that exhibits Karst features such as sinkholes, or solution channeling generally occurring in areas underlain by limestone or dolomite.
- If the site of the proposed formed manure storage structure is located in an area that exhibits karst terrain or an area that drains into a known sinkhole, minimum concrete standards will apply. In addition, the following requirements apply to all formed confinement feeding operations structures for the storage of non-dry or dry manure:
1. A minimum 5-foot vertical separation distance between the bottom of a formed manure storage structure and limestone, dolomite, or other soluble rock is required, if the formed manure storage structure is not designed by a PE or a NRCS engineer.

2. If the vertical separation distance between the bottom of the proposed formed structure and limestone, dolomite, or other soluble rock is less than five feet, the structure shall be designed and sealed by a PE or a NRCS engineer who certifies the structural integrity of the structure. A two feet thick layer of compacted clay liner material shall be constructed underneath the floor of the formed manure storage structure.

3. In addition, in an area that exhibits karst terrain or an area that drains into a known sinkhole, a PE, a NRCS engineer or a qualified organization shall submit a soil exploration study based on the results from soil borings or test pits to determine the vertical separation between the bottom of the formed structure and limestone, dolomite, or other soluble rock. A minimum of two soil borings or two test pits are required, equally spaced within each formed structure.

4. After soil exploration is completed, each soil boring and pit shall be properly plugged with concrete grout, bentonite or similar materials.

5. Ground water monitoring shall be performed as specified by DNR.

6. Back fill shall not start until the floor slats have been placed or permanent bracing has been installed, and shall be performed with material free of vegetation, large rocks, or debris.

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**Indiana**

*Source: 327 IAC 16-7-2, 327 IAC 16-8-1, Indiana CFO Guidance Manual (2002), 327 IAC 16-8-3*

For all confined feeding operations (CFO), new waste storage systems for liquid or solid manure must not be constructed in the following:

- Karst Terrain (some exceptions may apply);
- Floodway;
- 100-year flood plain, unless all waste management system access is at least 2 feet above the 100-year flood plain;
- Over mines (some exceptions may apply); or
- Soil that is expected to be in the seasonal high water table, unless the water table is lowered to keep it below the bottom of the waste storage structure.

IDEM may approve a new waste management system in karst terrain or over mines if the following site-specific information is submitted:

- For earthen manure storage structures for liquid manure, information from test holes at least five feet below the lowest point, except with karst topography where holes must go 10 feet deep or to the bedrock, whichever is shallower;
- Characterization of the seasonal water table and soil;
- Design specifications indicating adequate structural integrity and environmental protection; and
• Other information that IDEM deems necessary to ensure protection of human health and the environment.

Other information about other siting and design requirements is as follows:
• Soil and water table information from test holes for proposed liquid storage structures must be conducted by soil scientist, professional geologist, or professional engineer.
• If not in karst terrain, the base of the manure storage structure must be at least 2 feet above bedrock. If in karst terrain, IDEM will make the determination.
• Any drainage system to lower a seasonal water table around the base of a waste management system must be equipped with an access point for sampling.
• IDEM may require additional standards to protect human health or the environment in highly permeable soils, in areas with a high water table, on steep slopes, in proximity to bedrock or in sensitive areas. Some of the additional requirements may include liners, monitoring system, higher compaction, innovative technology or other protective measures.

Oklahoma

Sources: OAC 35:17-3-12, OAC 35:17-3-6(a)(17), OAC 35:17-3-6(a)(15)(C), OAC 35:17-3-6(a)(15)(E), 58 FR 7610

The following information on siting requirements applies to CAFOs in Oklahoma:
• USDA NRCS design specifications in the USDA NRCS Agricultural Waste Management Field Handbook Chapter 10 (formerly Tech Note 716) shall satisfy documentation of no hydrologic connection to groundwater so long as the facility is designed by USDA NRCS and does not exceed 1,000 animal units.
• All applications for LMFOs shall provide documentation relating to and verifying that a minimum ten (10) foot separation exists between the bottom of each waste retention structure and the highest annual or seasonal level of groundwater elevation at the waste retention structure site based on all data available, including the perched water table and regional water table or aquifer.
• For an application for a CAFO license or general permit, in no event shall a waste storage structure be located within the 100 year flood plain.
• Applications for LMFOs shall provide a description of geologic information, including at a minimum:
  1. The geology of the proposed license area down to and including the first aquifer, but not more than one hundred (100) feet below the bottom of the waste retention structure.
  2. Geological information based on published geological literature and subsurface investigation otherwise required for the license application, including lithology from water wells on site and seismicity information. Geologic information may be provided by an agency review of the project performed by the Oklahoma Geological Survey and provided to the Department with the license application.
• New facilities shall not be built in a water of the U.S. (including streams, rivers, lakes, wetlands, and playa lakes as defined in 40 CFR 122.2)
4.2.6 Dry manure storage

4.2.6.1 Siting Requirements

Recommendations:

Missouri should develop guidelines to site dry manure storage facilities to minimize losses of nutrients from dry manure to ground and surface waters.

Highlights and Impacts:

- Missouri designates that Class IA concentrated animal feeding operation facilities cannot be located in specific recreational watersheds; however, Missouri does not have siting requirements specific to dry manure storage structures.
- Iowa requires minimum concrete standards and may apply additional standards if the structure is to be located in an area with karst topography or in an area that drains to a known sinkhole.
- Indiana will approve a new storage system in karst terrain or over mines if specific requirements are met.

Missouri does not currently specify dry manure storage site requirements in the regulations. Dry manure nutrient losses occur when rainfall or runoff come into contact with stored manure solids. Loss of nutrients from stored dry manure can contribute to water quality impairment. Dry manure storage systems should be sited to prevent losses of manure nutrients to ground and surface waters.

Table 4.2.6.1-1 Comparison of state siting requirements for dry manure storage structures.

<table>
<thead>
<tr>
<th>State</th>
<th>Facility Type</th>
<th>Siting Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>Any animal feeding operation with dry manure storage</td>
<td>• All Class IA facilities may not be located in the Jacks Fork, Current, or Eleven Point Rivers watersheds.</td>
</tr>
<tr>
<td>Iowa</td>
<td>Any animal feeding operation with dry manure storage</td>
<td>• Minimum concrete standards, plus additional requirements (see appendix below) apply if structure is located in karst terrain or area that drains to a known sinkhole</td>
</tr>
<tr>
<td>Indiana</td>
<td>Any confined feeding operation with dry manure storage</td>
<td>• Must not construct in areas with karst terrain, high water table, mines, unless specific requirements are met</td>
</tr>
</tbody>
</table>
| Oklahoma  | Any concentrated animal feeding operation with dry manure storage | • Cannot be located in the 100-year flood plain  
• New facility shall not be built in a water of the U.S. |
Appendix 4.2.6.1: State-by-state summary

Missouri


A concentrated animal feeding operation (CAFO) in the state of Missouri has the following siting requirements apply in regulations:
• All Class IA facilities may not be located in the Jacks Fork, Current, or Eleven Point Rivers watersheds.

Iowa

Sources: IAC 567-65.15(19), IAC 567-65.8(3)d., IAC 567-65.15(7-10), IAC 567-65.15(14)

An animal feeding operation in the state of Iowa has the following siting requirements apply in regulations:
• If the site of the proposed formed manure storage structure is located in an area that exhibits Karst terrain or an area that drains into a known sinkhole, minimum concrete standards will apply. In addition, the following requirements apply to all formed confinement feeding operations structures for the storage of non-dry or dry manure.
  1. A minimum 5-foot vertical separation distance between the bottom of a formed manure storage structure and limestone, dolomite, or other soluble rock is required, if the formed manure storage structure is not designed by a PE or a NRCS engineer.
  2. If the vertical separation distance between the bottom of the proposed formed structure and limestone, dolomite, or other soluble rock is less than five feet, the structure shall be designed and sealed by a PE or a NRCS engineer who certifies the structural integrity of the structure. A two feet thick layer of compacted clay liner material shall be constructed underneath the floor of the formed manure storage structure.
  3. In addition, in an area that exhibits karst terrain or an area that drains into a known sinkhole, a PE, a NRCS engineer or a qualified organization shall submit a soil exploration study based on the results from soil borings or test pits to determine the vertical separation between the bottom of the formed structure and limestone, dolomite, or other soluble rock. A minimum of two soil borings or two test pits are required, equally spaced within each formed structure.
  4. After soil exploration is completed, each soil boring and pit shall be properly plugged with concrete grout, bentonite or similar materials.
  5. Ground water monitoring shall be performed as specified by DNR.
  6. Back fill shall not start until the floor slats have been placed or permanent bracing has been installed, and shall be performed with material free of vegetation, large rocks, or debris.
For all confined feeding operations (CFO), new waste storage systems for liquid or solid manure must not be constructed in the following:

- Karst Terrain (some exceptions may apply);
- Floodway;
- 100-year flood plain, unless all waste management system access is at least 2 feet above the 100-year flood plain;
- Over mines (some exceptions may apply); or
- Soil that is expected to be in the seasonal high water table, unless the water table is lowered to keep it below the bottom of the waste storage structure.

IDEM may approve a new waste management system in karst terrain or over mines if the following site-specific information is submitted:

- For earthen manure storage structures for liquid manure, information from test holes at least five feet below the lowest point, except with karst topography where holes must go 10 feet deep or to the bedrock, whichever is shallower;
- Characterization of the seasonal water table and soil;
- Design specifications indicating adequate structural integrity and environmental protection; and
- Other information that IDEM deems necessary to ensure protection of human health and the environment.

Other information about other siting and design requirements is as follows:

- Soil and water table information from test holes for proposed liquid storage structures must be conducted by soil scientist, professional geologist, or professional engineer.
- If not in karst terrain, the base of the manure storage structure must be at least 2 feet above bedrock. If in karst terrain, IDEM will make the determination.
- Any drainage system to lower a seasonal water table around the base of a waste management system must be equipped with an access point for sampling.
- IDEM may require additional standards to protect human health or the environment in highly permeable soils, in areas with a high water table, on steep slopes, in proximity to bedrock or in sensitive areas. Some of the additional requirements may include liners, monitoring system, higher compaction, innovative technology or other protective measures.
The following information on siting requirements applies to CAFOs in Oklahoma:

- USDA NRCS design specifications in the USDA NRCS Agricultural Waste Management Field Handbook Chapter 10 (formerly Tech Note 716) shall satisfy documentation of no hydrologic connection to groundwater so long as the facility is designed by USDA NRCS and does not exceed one thousand (1,000) animal units.

- All applications for LMFOs shall provide documentation relating to and verifying that a minimum ten (10) foot separation exists between the bottom of each waste retention structure and the highest annual or seasonal level of groundwater elevation at the waste retention structure site based on all data available, including the perched water table and regional water table or aquifer.

- For an application for a CAFO license or general permit, in no event shall a waste storage structure be located within the 100 year flood plain.

- Applications for LMFOs shall provide a description of geologic information, including at a minimum:
  1. The geology of the proposed license area down to and including the first aquifer, but not more than one hundred (100) feet below the bottom of the waste retention structure.
  2. Geological information based on published geological literature and subsurface investigation otherwise required for the license application, including lithology from water wells on site and seismicity information. Geologic information may be provided by an agency review of the project performed by the Oklahoma Geological Survey and provided to the department with the license application.

- New facilities shall not be built in a water of the U.S. (including streams, rivers, lakes, wetlands, and playa lakes as defined in 40 CFR 122.2)
4.2.6.2 Structural Requirements

Recommendations:

Missouri should develop recommendations for structural requirements for dry manure storages.

Highlights and Impacts:

- Iowa is the only state with regulations explicitly stating structural requirements for dry manure storage systems.

Missouri does not currently specify structural requirements for dry manure storages in the regulations.

Dry manure storage systems should be designed to prevent losses of manure nutrients to ground and surface waters. Storm water contact with dry or solid manure should be minimized and any storm water that becomes contaminated due to contact with stored dry manure should be treated as a liquid manure stream.


Table 4.2.6.2-1 Comparison of state structural requirements for dry manure storage structures

<table>
<thead>
<tr>
<th>State</th>
<th>Facility Type</th>
<th>Structural Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>Any dry manure storage structure</td>
<td>None</td>
</tr>
<tr>
<td>Iowa</td>
<td>Any dry manure storage structure</td>
<td>Shall be designed by a professional or NRCS engineer or shall meet minimum concrete standards, plus additional requirements (see appendix below) apply if structure is located in karst terrain or area that drains to a known sinkhole</td>
</tr>
<tr>
<td>Indiana</td>
<td>Any dry manure storage structure</td>
<td>None</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>Any dry manure storage structure</td>
<td>None</td>
</tr>
</tbody>
</table>
Appendix 4.2.6.2: State-by-state summary

**Missouri**

The state of Missouri does not have regulations in place that specify details for any dry manure storage siting information.

**Iowa**

Sources: IAC 567-65.15(14), IAC 567-65.15(1-3), IAC 567-65.2

A formed structure for the storage of manure exclusively in a dry form shall be designed and constructed in accordance to one of the following:

- Engineering report, plans and specifications prepared by a professional or NRCS engineer. Design considerations shall conform with the American Concrete Institute (ACI) Building Code 318, ACI-360, or ACI-360; or Portland Cement Association (PCA) publications EB075, EB001 or IS072; or Midwest Plan Service (MWPS) publications MWPS-36.

- If a formed manure storage structure, that stores manure exclusively in a dry form, is to be constructed above ground, and the design is not prepared and sealed by a PE or a NRCS engineer, the requirements for 1, 3, 4, 5, 6, 8 and 12 from Iowa Administrative Code 567-65.15(14)a(2) for minimum concrete standards are required for a formed manure storage structure other than that used for dry manure if the formed manure storage structure is not designed and sealed by a professional or NRCS engineer will apply. Consideration shall be given to internal and external loads including but not limited to wind loads, building load, manure pile and equipment vehicle loads.

- If a formed manure storage structure, that stores manure exclusively in a dry form, is to be constructed below or partially below ground, and the design is not prepared and sealed by a PE or a NRCS engineer, the requirements for 1-15 from Iowa Administrative Code 567-65.15(14)a(2) for minimum concrete standards are required for a formed manure storage structure other than that used for dry manure if the formed manure storage structure is not designed and sealed by a professional or NRCS engineer will apply. Wall design shall be in accordance with Appendix D in IAC 567-65 or in accordance with MWPS-36. Consideration shall be given to internal and external loads including but not limited to lateral earth pressures, hydrostatic pressures, wind loads, manure pile and equipment vehicle loads.

Minimum manure control requirements for open feedlots and confinement feeding operations are as follows:

- Open feedlots covered by an operation permit must have a minimum level of manure control is retention of all manure flows from feedlot and other manure-contributing areas resulting from 25-year, 24-hour precipitation event. Control of manure may be done by manure-retention basins, terraces or other runoff control methods.
• Other open feedlots must have a minimum level of manure control of removal of settleable solids from the manure prior to discharge into a water of the state.
• Confined feeding operations must have a minimum level of manure control of retention of all manure produced in confinement enclosures between periods of manure application. Manure must not be discharged into a water of the state or into a tile line that discharges to a water of the state.
• No direct discharge will be allowed from an animal feeding operation into a public lake, sinkhole or an agricultural drainage well.

Indiana

The state of Indiana does not have regulations in place that specify details for any dry manure storage design information.

Oklahoma

The state of Oklahoma does not have regulations in place that specify details for any dry manure storage design information.
4.3 Monitoring / Inspection and Safety

**Recommendations:**

- Engineering design specifications for earthen manure storage structures in Missouri require a compacted clay liner. If construction of a clay liner is monitored and certified by a professional engineer, monitoring of the groundwater around the structure should not be a permit requirement.

- Several site-specific permits in Missouri contain monitoring and sampling requirements that are very time-consuming to collect and costly to analyze. (Table 3.4-2 summarizes). The permit required sampling frequency is rarely justified to protect water quality. For example, one site-specific permit requires fresh water lake samples be taken five times per year. This site-specific permit requires that each lake water sample be analyzed for about 30 elements, compounds and other chemical or biological properties that must be measured in an approved laboratory.

**Highlights and Impacts:**

The monitoring requirements for manure storage facilities and land application sites vary among states and the type of system being operated. Monitoring the depth of liquids in the storage basin, daily precipitation totals at the location of the storage basin, and groundwater quality in the vicinity of the storage basin are often required.

- Oklahoma is the only state that does not require annual submission of a report to the regulatory agency.
- Site-specific permits in Missouri appear to require more comprehensive monitoring than is required in other states.

Proper construction and operation of manure storage facilities is essential to minimize the risks of contamination of groundwater and surface water. Monitoring liquid depths in liquid manure storage systems, precipitation events, and land application practices are beneficial to protecting water quality. Monitoring obligates the facility operator to remain aware of the status of the storage system, environmental factors, and land treatment practices on a scheduled basis.

Monitoring requirements can create competitiveness issues if they are too costly, too difficult to achieve or are applied inequitably. As long as manure storage and treatment facilities are constructed to proper design specifications, monitoring of groundwater near these structures would not be expected to reveal contamination, and should not automatically be required as part of an operating permit. Stream nutrient monitoring can be a very costly requirement for an animal production operation on an annual, semi-annual, or quarterly basis,
although it is often a necessary aspect of regulatory enforcement during a permit violation situation.

Monitoring and inspection requirements can be essential if they provide a clear water quality benefit but they should not be imposed simply on the basis of the size of an operation.

Table 4.3-1. Comparison of state reporting and monitoring requirements.

<table>
<thead>
<tr>
<th>State</th>
<th>Annual Report Required?</th>
<th>Monitoring/ Inspection Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>MO</td>
<td>Yes</td>
<td>• General permit requires: &lt;br&gt; - Records of monthly lagoon level, rainfall, and land application practices &lt;br&gt; - Continuous monitoring of irrigation system w/out automatic shut-off &lt;br&gt; • Class IA (&gt;7000 AU) site-specific permit requires: &lt;br&gt; - DNR shall inspect sites with flush systems quarterly &lt;br&gt; - Visual inspection of waste collection, transport and storage system every 12 hours during operation; maintain records for 3 years &lt;br&gt; - Flush system must have overflow protection device &lt;br&gt; - Soil and stream nutrient monitoring (see list of constituents in Appendix) &lt;br&gt; - Groundwater monitoring may be required &lt;br&gt; - Wastewater nutrient levels, field characteristics, crop yield data, land application details, rainfall, and manure storage levels</td>
</tr>
<tr>
<td>IA</td>
<td>Yes</td>
<td>• Annual manure management plan shall contain application records, manure production and nutrient records, crop yield data, soil loss prevention methods, and odor reduction strategies if spray irrigation is used &lt;br&gt; • Self-monitoring may be required in any operating permit for manure storage liquid levels, daily precipitation, groundwater quality or other measurements deemed necessary &lt;br&gt; • Land application records must be maintained for 3 years and available for inspection &lt;br&gt; • IDNR shall conduct annual inspection of each unformed manure storage structure &lt;br&gt; • Construction permit applicants shall investigate for tile lines during excavation for formed manure storage structures</td>
</tr>
<tr>
<td>IN</td>
<td>Yes</td>
<td>• Annual report must be submitted and contain animal types and numbers, manure production records, manure transfer records, acres where manure application is controlled, summary of discharges &lt;br&gt; • CFO’s must monitor manure storage freeboard monthly; records must be maintained for an unspecified period of time &lt;br&gt; • Spray irrigation systems may require flow monitoring devices and must be under constant supervision during operation &lt;br&gt; • Any drainage system to lower a seasonal water table around the base of a waste storage system must be equipped with an access point for sampling &lt;br&gt; • IDEM may inspect CFOs at any time and review records, take samples, or conduct monitoring</td>
</tr>
<tr>
<td>OK</td>
<td>No</td>
<td>• Pollution Prevention Plan (PPP) requirements include: &lt;br&gt; - Operation information &lt;br&gt; - Groundwater testing by ODEQ testing lab at least annually &lt;br&gt; - Soil testing from land application sites by ODEQ testing lab at least annually &lt;br&gt; - Manure storage structure testing and record of weekly liquid level &lt;br&gt; - Rainfall records &lt;br&gt; - Other measurements deemed necessary &lt;br&gt; • Spills, discharges, etc. shall be recorded and records maintained for life of LMFO; other operations maintain records for at least 3 years &lt;br&gt; • Facilities and material handling areas shall be inspected by owner for pollution potential at least annually &lt;br&gt; • Annual inspection of operation will be performed by the department &lt;br&gt; • Department may sample wells on or near the site &lt;br&gt; • LMFOs shall install a leak detection system or monitoring wells</td>
</tr>
</tbody>
</table>
Appendix 4.3: State-by-state summary

Missouri

Sources: RSMO 640.750, 10 CSR 20-6.300(2)(C)(5), 10 CSR 20-6.010(8)(A)5, 10 CSR 20-6.300(3)(C)2, 10 CSR 20-6.300(5)(C)1, MO-G01 General Permit, BMPs for CAFOs (2001), 10 CSR 20-6.300(3)(C)5

General Permit
- An annual report must be submitted by the 28th of January for the previous calendar year. The report shall include a copy of monitoring results and other records required by the permit.
- Monitoring in the general permits includes:
  1. Discharge flow;
  2. Rainfall;
  3. The land application period;
  4. Amount of land applied;
  5. Application area;
  6. Application rate; and
  7. Lagoon or storage structure freeboard (once a month)
- Spray irrigation equipment that does not have an automatic shut-off system to detect pressure loss or mechanical breakdowns must have an operator on-site all times during operation to monitor for proper operation.
- As a condition of each National Pollutant Elimination Discharge System (NPDES) permit, state officials may enter a facility to conduct inspections or monitoring.

Class IA CAFO
- DNR shall conduct at least one on-site inspection quarterly for a Class IA operation that uses a flush system.
- Class IA CAFOs with wet handling system must:
  1. During construction of wet handling system, full-time resident engineer must inspect and certify lagoon seal construction and compaction tests
  2. During operation, one or more persons to visually inspect the waste handling facility and holding basins. Visual inspections must be made every 12 hours with a deviation from the 12-hour requirement not to exceed 3 hours. Records must be kept for a minimum of 3 years.
  3. Class IA CAFO utilizing flush system must have an electronic or mechanical shutoff in the event of pipe stoppage or backflow.
- Monitoring reports may be required for quarterly and annual reports dependent upon the site-specific facility permit
- Permits require environmental monitoring and reporting including nitrogen, phosphorus, and potassium in soils, in-stream monitoring of waters of the state that adjoin or pass through the property; and groundwater monitoring wells if determined to be necessary
• Permits shall require operational monitoring and reporting, including nutrient levels in wastewater to be land applied, field slopes, locations, vegetation grown, crop yields, soil moisture, operation of land application equipment, application rates, rainfall, water level measurements in storage structures, operation of land application equipment and other pertinent information.

• As a condition of each National Pollutant Elimination Discharge System (NPDES) permit, state officials may enter a facility to conduct inspections or monitoring.

Iowa

Sources: IC 459.308, IC 459.601, IAC 567-65.10(4), IAC 567-63.5, IAC 567-65.15(1)c, IAC 567-65.15(20), IAC 567-65.17(13-14), IAC 567-65.17(3)

• Iowa Department of Natural Resources (IDNR) shall conduct a routine inspection of each unformed manure storage structure at least once each year. The department shall inspect the site at a reasonable time after providing at least twenty-four hours' notice to the person owning or managing the confinement feeding operation. Inspections conducted as needed by department during permit application, facility construction activities, and in response to complaints.

• The following self-monitoring requirements may be imposed on an animal feeding operation in any operation permit issued to such an operation. Reports of self-monitoring results shall be submitted to department quarterly.
  1. Measurement of liquid level in a waste storage facility on a periodic basis
  2. Measurement of daily precipitation
  3. Sampling and analysis of groundwater
  4. Other measurements necessary to evaluate the adequacy of a waste disposal system.

• The applicant for a construction permit for a formed manure storage structure shall investigate for tile lines during excavation for the structure.

• A formed manure storage structure which is constructed to allow the storage of manure wholly or partially above ground and which has an external outlet or inlet below the liquid level shall have the following:
  1. Two or more shutoff valves on any external outlet or inlet below the liquid level. At least one shutoff valve shall be located inside the structure and be operable if the external valve becomes inoperable or broken off.
  2. All external outlets or inlets below the liquid level shall be barricaded, encased in concrete, or otherwise protected to minimize accidental destruction.

• Land application records must be maintained and available for inspection. They should be maintained for at least 3 years. These records must include:
  1. Method of application
  2. Dates manure was spread or sold
  3. Location of field where manure was applied
4. Manure application rate

- A confined feeding operation shall submit the following with the annual manure management plan.
  1. Land Area required for manure application.
  2. Total Nitrogen Available.
  3. Optimum crop yield and crop usage rate.
  4. Methods and timing of manure application.
  5. Location of application.
  7. Methods, structures or practices that will be used to reduce soil loss and prevent surface water pollution.
  8. Methods or practices to reduce odor if spray irrigation is used.

**Indiana**

Sources: 327 IAC 16-9-1, 327 IAC 15-15-11, 327 IAC 16-4-2(5), 327 IAC 15-15-10(3), 327 IAC 16-10-3(c), 327 IAC 16-8-3, 327 IAC 5-1-3

These requirements apply to confined feeding operations and concentrated animal feeding operations unless specified otherwise.

- The owner/operator shall inspect all waste management systems for compliance with freeboard at least one time a month. Records of monthly inspections and maintenance must be maintained and completed.
- All earthen berms for manure storage structures must be stabilized and maintained for visual inspection. The berm may be stabilized with vegetation or alternative erosion control measures.
- Indiana Department of Environmental Management (IDEM) may inspect confined feeding operations at any time. They may also review records, take samples, or conduct monitoring.
- Design requirements for all new waste management systems specify that any drainage system to lower a seasonal water table around the base of a waste management system must be equipped with an access point of sampling.
- Annual report for a CAFO must be submitted to the commissioner by Feb. 15 of each year for the previous calendar year. An annual report must consist of:
  1. Number and type of animals;
  2. Estimated amount of total manure, litter, and process wastewater;
  3. Estimated amount of transferred manure to other persons;
  4. Total number of acres covered by manure management plan;
  5. Total number of acres under control of CAFO for land application; and
- Spray irrigation of manure may require devices to detect pressure loss due to leaks and devices to shut down the system if leaks are detected. Spray irrigation must be under constant supervision of person designated in the permit approval or in accordance to an irrigation plan.
• For a CAFO, whenever necessary, persons may be required to make reports, install or use monitoring equipment, sample effluents, sample wastestreams or provide other data as needed.

Oklahoma

Sources: OAC 35:17-3-11, 58 FR 7610, OAC 35:17-3-19

The following requirements apply to concentrated animal feeding operations that are required to apply for a CAFO license and NPDES general permit.

• The owner/operator named in the pollution prevention plan (PPP) as the individual responsible for drafting or implementing the plan shall be responsible for inspections and record keeping.

• Incidents including spills, discharges, and other information describing the pollution potential and quantity of the discharge shall be included in the records. Inspections and maintenance activities shall be documented and recorded. These records shall be kept on site for a minimum of three (3) years. Owners of LMFOs shall retain the records for so long as the facility is in operation.

• The authorized person named in the PPP shall require inspection of designated equipment and facility areas. Material handling areas shall be inspected for evidence of or the potential for pollutants entering the drainage system. A follow-up procedure shall be used to insure that appropriate action has been taken in response to the inspection.

• In addition to the department annual inspection, a complete inspection of the facility shall be performed at least annually by the owner. A report documenting the findings of the inspection shall be prepared, which includes the operative status of the check valve system on applicable wells. The inspection shall be conducted by the authorized person named in the PPP to verify that the description of potential pollutant sources is accurate, the drainage map has been updated or otherwise modified to reflect current conditions and the controls outlined in the PPP to reduce pollutants are being implemented and are adequate.

• The department may sample wells on or near the site.

• Records documenting significant observation made during the site inspection shall be retained as part of the PPP. Records of all inspections shall be maintained for a period of 3 years. Owners of LMFOs shall retain all records for so long as the facility is in operation.

• Environmental/operational information is included in a PPP that is required prior to the submission of the CAFO license. A PPP shall include: testing of groundwater, nitrogen as nitrate, total phosphorous, and fecal coliform bacteria levels shall be performed by an Oklahoma Department of Environmental Quality (ODEQ) certified independent testing laboratory at least annually. All owners of LMFOs shall install a leak detection system or monitoring wells in accordance with criteria approved by the department. All
testing shall establish a management record, with all costs paid by the owner. Owners of LMFOs shall sample groundwater annually for electrical conductivity, pH, ammonium-nitrogen, nitrate-nitrogen, total phosphorus, and fecal coliform bacteria. Soil tests from land application sites shall be performed by an ODEQ certified testing laboratory at least annually. Owners of LMFOs shall perform soil tests for electrical conductivity, pH, nitrate-nitrogen, ammonium-nitrogen, organic matter, sodium, potassium, calcium, magnesium, available phosphorus, and total nitrogen. Owners of LMFOs shall sample waste retention structure contents for ammonium-nitrogen, nitrate-nitrogen, total phosphorus, electrical conductivity, pH, sodium, potassium, calcium, magnesium, total nitrogen, and total solids. A rain gauge shall be kept on site and properly maintained. A log of all measurable precipitation events shall be kept with the PPP.

• As a part of a CAFO general NPDES permit, EPA requires the following information to be submitted as a part of the permit.
  1. Discharge to a water of the U.S. is required to be reported within 14 working days.
  2. Sampling of discharge may be required. Sample analysis would include fecal coliform bacteria, 5-day biochemical oxygen demand, total suspended solids, ammonia nitrogen and any other pesticide with reason believed to be in the discharge.

• Owners of LMFOs shall retain these records on site for as long as the facility is in operation.
  1. Weekly measure of water level in the retention facility;
  2. Quarterly inspection and maintenance reports;
  3. Other specific information required by the department.
4.4 Nutrient Management

Recommendation:

Adoption of the phosphorus rule should focus on strategies that are most likely to improve water quality in impaired watersheds and are the most feasible for farmers. Example strategies include:

- Promote unilateral phosphorus reduction strategies such as improved feed efficiency, erosion reduction practices and improved placement and timing of manure applications.
- Allow phosphorus banking strategies to minimize the time impact of a phosphorus rule and allow most farmers to apply manure as a complete fertilizer in the year of application without needing to invest in new equipment.

Agriculture and regulatory advocates should enter a dialogue on how best to insure that manure sold or given away by an operation is applied in an appropriate manner while facilitating a market for manure.

- Missouri plant available nitrogen calculation should be simplified to eliminate tracking of insignificant quantities of nitrogen.

- Calculations determining land needs for nutrient management plans in construction permits should be based on tabular values that are equal to the mean plus one standard deviation unless the operation can document that a lower manure nutrient content is anticipated.

- Missouri site-specific permit soil testing requirements should conform to recommended agronomic sampling strategies.

Highlights and Impacts:

- Nutrient management plans are required of all permitted operations in all states and all states require submitting the plan to the state.

- States currently have nitrogen-based plans except for phosphorus limits in Oklahoma and some site-specific permits in Missouri. All states are in the process of revising current regulations to meet the new federal requirements for phosphorus assessment on all fields receiving manure.

- Missouri has the most detailed and extensive nitrogen availability calculation of the four surveyed states.

Nutrient management planning is the core strategy to protect water quality from degradation due to land application of manure. The revised USEPA rules for concentrated animal feeding operations (CAFOs) require that all states adopt
standards that require a phosphorus assessment on all fields that receive manure. Information in this report is based on current rules before changes necessitated by the new USEPA requirements.

Reducing phosphorus loss from agricultural fields is a complex issue. The regulatory challenge is further complicated because phosphorus impairment is a watershed process yet regulations apply to individual operations within a watershed. In addition manure sold or given away also falls outside the purview of a permitted operation’s nutrient management plan.

Not all strategies for reducing phosphorus loss from agricultural fields are equally effective. There are many misconceptions about how to improve water quality through phosphorus management and there are prominent examples of phosphorus limits being imposed on farmers that have little benefit to water quality but have a large negative impact on farm competitiveness.

We recommend that adoption of phosphorus rules in Missouri carefully consider the extensive information available in the state on strategies that are most effective at reducing phosphorus loss from fields and have the least impact on the feasibility of manure management practices on the farm.

Both unilateral and transfer strategies can be important components of a program to improve phosphorus management on a farm. Unilateral strategies reduce phosphorus loss from a field, farm or watershed without transferring the burden of water quality management to other locations. These are the most desirable strategies because they reduce phosphorus loss to a water body with no potential negative effect in another area.

Examples of unilateral strategies include:

- Land treatment practices such as setbacks and erosion control that reduce phosphorus loss from a field.
- Improved manure application timing and placement that prevents runoff before the applied phosphorus has reacted with the soil.
- Improved animal rations reducing the amount of phosphorus entering the farm as feed.

Transfer strategies improve water quality on specific fields, farms or watersheds by moving manure to other locations. The real impact of a transfer strategy on water quality must consider both the benefit to the field, farm or watershed exporting manure and the impact on the farm, field or watershed importing the manure. Transfer strategies can improve water quality if the exported manure is used to replace chemical fertilizer applications or enhance crop removal of nutrients on the fields importing manure. Transfer of manure to more marginal fields with more marginal timing and/or limited demand for the applied nutrients may create a net increase in phosphorus loss.
Unilateral strategies are particularly desirable because they result in an absolute reduction in the phosphorus losses from agricultural fields. We need to promote unilateral and effective transfer strategies with our regulatory system. These strategies will improve water quality and improve competitiveness compared to poorly conceived phosphorus regulations.

All parties in the debate on manure management acknowledge the challenge of insuring that manure that is sold or given away by an operation is applied appropriately. Such manure is appropriately no longer covered by the terms of the concentrated animal feeding operation permit except for basic record keeping requirements. Extending regulations to all land receiving manure will depress or eliminate the market for manure. A lack of any controls on this manure will promote permitted operations to divest of land base for manure application and sell or give away all their manure.

There is an opportunity for the agricultural and regulatory communities to work together to develop strong markets for manure. By increasing the value of manure as a fertilizer farmers would have more incentive to manage manure nutrients appropriately. Such a dialogue will lead to improvements in water quality. The effect on competitiveness is unknown although most current suggestions hurt competitiveness. This explains, in part, the contentiousness surrounding this topic.

Missouri has the most complex nitrogen availability calculation of the surveyed states. The current plant available nitrogen (PAN) calculation requires tracking organic nitrogen contributions from manure for three years. Frequently the amount of nitrogen in the third year is less than five to ten pounds. Requiring farmers to track this amount of nitrogen is time consuming, adds complication and gives the general public a false sense of the precision of our nitrogen application strategies. Improving the PAN equation has no impact on water quality while improving competitiveness by simplifying nutrient management and record keeping requirements.

Missouri site-specific permits have many special conditions and sampling requirements (see section 3.4). In some permits there are requirements for standard soil tests on an annual basis as part of an agronomic nutrient management plan. There is no agronomic basis for annual soil tests except in very specific situations where the amount of phosphorus applied exceeds the amount recommended and there is a question about the need for more phosphorus. Site-specific permit conditions should not contain agronomic sampling requirements that extensively deviate from standard agronomic practices. Such requirements have significant time and expenses but no agronomic or water quality benefit.
<table>
<thead>
<tr>
<th>State</th>
<th>Nutrient management plan required? (size requirement)</th>
<th>Submitted to regulatory authority?</th>
<th>Submission frequency</th>
<th>Nutrient basis</th>
<th>Manure test requirements (frequency)</th>
<th>Soil testing requirements (frequency)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri- General Permit</td>
<td>Yes (typically ≥ 1000 animal units)</td>
<td>Submitted to state</td>
<td>Once per permitting cycle (5 years)</td>
<td>Nitrogen</td>
<td>Preferred (annually)</td>
<td>Preferred (annual estimate of crop N need required based on 3 to 5-yr testing cycle)</td>
</tr>
<tr>
<td>Missouri- Site-specific Permit</td>
<td>Yes (typically ≥ 7000 animal units)</td>
<td>Submitted to state</td>
<td>Once per permitting cycle (5 years)</td>
<td>Nitrogen and phosphorus</td>
<td>Every season manure is applied (up to 4 times per year)</td>
<td>Yes (variable, often annually)</td>
</tr>
<tr>
<td>Iowa- CFO¹</td>
<td>Yes (≥ 500 animal units)</td>
<td>Submitted to state and county</td>
<td>Annually</td>
<td>Nitrogen</td>
<td>Recommended, tabular values provided</td>
<td>Optional, tabular values provided</td>
</tr>
<tr>
<td>Iowa- Open Feedlot</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Indiana- CFO and CAFO²</td>
<td>Yes (≥ 300 cattle, 600 swine or sheep or 30,000 poultry)</td>
<td>Submitted to state</td>
<td>Once every 5 years</td>
<td>Nitrogen</td>
<td>Yes (not older than 3 years)</td>
<td>Yes (not older than 3 years)</td>
</tr>
<tr>
<td>Oklahoma- CAFO License</td>
<td>Yes (typically ≥ 1000 animal units)</td>
<td>Submitted to state</td>
<td>Annually</td>
<td>Nitrogen and phosphorus in some cases</td>
<td>Yes (annually)</td>
<td>Yes (annually)</td>
</tr>
<tr>
<td>Oklahoma- all Poultry that are not CAFOs</td>
<td>Yes (0 to 999 animal units)</td>
<td>Submitted to state</td>
<td>At least once every 6 years</td>
<td>Nitrogen and phosphorus</td>
<td>Yes (frequency not stated)</td>
<td>Yes (frequency not stated)</td>
</tr>
</tbody>
</table>

¹ CFO = confined feeding operation.
² CAFO = concentrated animal feeding operation.
Table 4.4-2. Nutrient availability calculations.

<table>
<thead>
<tr>
<th>State</th>
<th>Nitrogen</th>
<th>Phosphorus</th>
<th>Potassium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>Plant available Nitrogen (PAN):</td>
<td>100% available per recommendation by extension</td>
<td>100% available per recommendation by extension</td>
</tr>
<tr>
<td></td>
<td>PAN = Organic N X coefficient + Ammonia N X coefficient</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Organic N coefficient depends on manure type and tracks mineralization for three years.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ammonia N coefficient dependent on time to incorporation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa</td>
<td>Nitrogen availability = manure N X availability factor</td>
<td>Not mentioned</td>
<td>Not mentioned</td>
</tr>
<tr>
<td></td>
<td>• Availability factor varies based on time to incorporation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indiana</td>
<td>Tabular values or calculate “potentially available nitrogen”.</td>
<td>Not mentioned</td>
<td>Not mentioned</td>
</tr>
<tr>
<td></td>
<td>Potentially or plant available nitrogen =</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organic N X mineralization factor + ammonium N X (1 – loss factor)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Organic N coefficient depends on manure type; cited reference provides mineralization factor for the year of application.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ammonium loss coefficient dependent on time to incorporation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oklahoma</td>
<td>Nitrogen availability = manure N X availability factor</td>
<td>90% available per recommendation by extension</td>
<td>90% available per recommendation by extension</td>
</tr>
<tr>
<td></td>
<td>• Availability factor varies based on manure type and time to incorporation.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 4.4: State-by-state summary

Missouri

Sources: 10 CSR 20-6.300(3)(C)6, CAFO BMP D.1(b), CAFO BMP B.6

General Operating Permit
Code of State Regulations has no specific language on nutrient management planning for the general permit. All references to specific nutrient management practices are in separate documents outlining Best Management Practices for CAFOs. These are typically attached to the general operating permit. These state that the nitrogen application rates must be based on a "conservative" or "plant available" management approach. The conservative approach specifies the annual application rate is based on applying 100 pounds per acre of nitrogen. The total nitrogen is based on the total nitrogen content of manure at the time of application although manure testing is not required. The plant available nitrogen (PAN) approach specifies the annual application rate is based on the available nitrogen uptake of the plants being grown using annual testing of manure and soils to determine nitrogen requirements. The PAN approach is required if the application rate will exceed the conservative approach or if commercial fertilizer will be applied to those sites during the same cropping year as manure application. The PAN approach requires manure testing. The conservative approach is not favored by MDNR for most operations.

Site-Specific Permits
All Class IA facilities (≥ 7000 animal units) that use wet handling systems must test for nitrogen, phosphorous and potassium levels in soils. The annual report must include a summary of the soil test results for each field. Site-specific permits must also test for the nutrient levels in manure that is to be land applied. Frequencies of soil and manure testing are written in the specific permit. Specific criteria for procedures must be used to gather the samples. There are site-specific permits that require annual soil testing for phosphorus. There are also examples of site-specific permits that require the operation to use phosphorus limits.

Nutrient availability coefficients

Table 4.4-3. Missouri ammonia N availability coefficients.

<table>
<thead>
<tr>
<th>Type of application</th>
<th>Ammonia-N availability coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Application</td>
<td>0.60</td>
</tr>
<tr>
<td>Surface Application followed by incorporation</td>
<td>0.90</td>
</tr>
<tr>
<td>Subsurface Injection</td>
<td>0.95</td>
</tr>
</tbody>
</table>
Table 4.4-4. Missouri organic N availability coefficients.

<table>
<thead>
<tr>
<th>Time after Application Year(^1)</th>
<th>Organic N availability coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lagoons (all animal and poultry types)</strong></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>0.35</td>
</tr>
<tr>
<td>Year 2</td>
<td>0.18</td>
</tr>
<tr>
<td>Year 3</td>
<td>0.09</td>
</tr>
<tr>
<td>Cumulative</td>
<td>0.62(^2)</td>
</tr>
<tr>
<td><strong>Liquid storage basin (except poultry)</strong></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>0.35</td>
</tr>
<tr>
<td>Year 2</td>
<td>0.18</td>
</tr>
<tr>
<td>Year 3</td>
<td>0.09</td>
</tr>
<tr>
<td>Cumulative</td>
<td>0.62(^2)</td>
</tr>
<tr>
<td><strong>Poultry slurry or dry litter</strong></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>0.60</td>
</tr>
<tr>
<td>Year 2</td>
<td>0.10</td>
</tr>
<tr>
<td>Year 3</td>
<td>0.05</td>
</tr>
<tr>
<td>Cumulative</td>
<td>0.75(^2)</td>
</tr>
<tr>
<td><strong>Manure solids- Swine, beef, dairy (without bedding)</strong></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>0.35</td>
</tr>
<tr>
<td>Year 2</td>
<td>0.18</td>
</tr>
<tr>
<td>Year 3</td>
<td>0.09</td>
</tr>
<tr>
<td>Cumulative</td>
<td>0.62(^2)</td>
</tr>
<tr>
<td><strong>Manure solids- Swine, beef, dairy (with bedding)</strong></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>0.25</td>
</tr>
<tr>
<td>Year 2</td>
<td>0.13</td>
</tr>
<tr>
<td>Year 3</td>
<td>0.07</td>
</tr>
<tr>
<td>Cumulative</td>
<td>0.45(^2)</td>
</tr>
</tbody>
</table>

\(^1\) Year 1= manure application made in current year; Year 2=manure application in previous year; Year 3=manure application made two years ago

\(^2\) MR Factor for individual years is factor from table times organic N in manure applied in the first year

**Iowa**

*Source: IAC 567-65.17*

Iowa requires that manure management plans to be submitted annually for certain confinement feeding operations. A confinement feeding operation that is required to submit a manure management plan must not apply manure in excess of the nitrogen use levels necessary to obtain optimum crop yields. The nitrogen application rates shall be based on total nitrogen content of the manure unless the calculations are submitted to show crop usage rates based on plant available nitrogen have not been exceeded for the cropping schedule. The information that is needed to determine the calculations can be obtained from a table in Chapter 65 of the Iowa Administrative Code (IAC), actual testing samples or other creditable sources.
The manure volume that is used in the manure management plan may also be obtained from a Chapter 65 IAC table, credible sources, or actual manure volume from the confinement feeding operation may be used.

Soil testing is required only if manure will be applied in excess of the annual nitrogen crop usage rate. Maximum manure application cannot exceed 1.5 times the annual crop nitrogen usage rate; or the rate which provides the recommended amount of phosphorus or potassium, whichever is more limiting, to obtain the optimum crop yield.

Nutrient availability coefficients

The correction factor for nitrogen losses shall be determined for the method of application by the following, or from other creditable sources for standard nitrogen losses

Table 4.4-5. Iowa N availability coefficients.

<table>
<thead>
<tr>
<th>Type of Application</th>
<th>Correction Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface-apply dry with no incorporation</td>
<td>0.70</td>
</tr>
<tr>
<td>Surface-apply liquids with no incorporation</td>
<td>0.75</td>
</tr>
<tr>
<td>Surface-apply liquid or dry with incorporation with 24 hours</td>
<td>0.95</td>
</tr>
<tr>
<td>Surface-apply liquid or dry with incorporation after 24 hours</td>
<td>0.80</td>
</tr>
<tr>
<td>Knifed in or soil injection of liquids</td>
<td>0.98</td>
</tr>
<tr>
<td>Irrigated liquids with no incorporation</td>
<td>0.60</td>
</tr>
</tbody>
</table>

Indiana

Sources: 327 IAC 16-7-11(a-e), 327 IAC 15-15-10(5)

CFO
A manure management plan (MMP) must be submitted with all CFO approval applications. This plan must be renewed at least once every five years for confined feeding operations. Procedures for soil testing and manure testing must be included with MMP. A soil test must be obtained that provides sufficient information about soil fertility to allow for nutrient recommendations for existing or planned crops and to minimize nutrient leaching. Soil testing must be conducted a minimum of once every three years unless a different frequency is justified in the MMP. Manure tests must be obtained that provides sufficient information about the manure content to allow for nutrient recommendations for existing or planned crops and to minimize nutrient leaching. One manure test must be conducted for each type of manure generated and conducted a minimum of once every three years unless a different frequency is justified in the MMP.
CAFO
A CAFO has all the same requirements that a CFO is required except CAFOs must additionally conduct manure testing for nitrogen and phosphorus annually.

Table 4.4-6. Nutrients in liquid manure at the time of application

<table>
<thead>
<tr>
<th>Species</th>
<th>Waste handling</th>
<th>Dry matter %</th>
<th>NH₄+N</th>
<th>N</th>
<th>P₂O₅</th>
<th>K₂O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swine</td>
<td>Liquid pit</td>
<td>4</td>
<td>26</td>
<td>36</td>
<td>27</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Lagoon</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Beef</td>
<td>Liquid pit</td>
<td>11</td>
<td>24</td>
<td>40</td>
<td>27</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>Lagoon</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Dairy</td>
<td>Liquid pit</td>
<td>8</td>
<td>12</td>
<td>24</td>
<td>18</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Lagoon</td>
<td>1</td>
<td>2.5</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Veal Calf</td>
<td>Liquid pit</td>
<td>3</td>
<td>19</td>
<td>24</td>
<td>25</td>
<td>51</td>
</tr>
<tr>
<td>Poultry</td>
<td>Liquid pit</td>
<td>13</td>
<td>64</td>
<td>80</td>
<td>36</td>
<td>96</td>
</tr>
</tbody>
</table>

1 Includes lot runoff

Table 4.4-7. Amount of nitrogen mineralized or released from organic nitrogen forms in manure to plant available forms during the growing season.

<table>
<thead>
<tr>
<th>Manure Type</th>
<th>Manure Handling</th>
<th>Mineralization Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swine</td>
<td>Fresh</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>Anaerobic liquid</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>Aerobic liquid</td>
<td>0.30</td>
</tr>
<tr>
<td>Beef</td>
<td>Solid without bedding</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>Solid with bedding</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>Anaerobic liquid</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>Aerobic liquid</td>
<td>0.25</td>
</tr>
<tr>
<td>Dairy</td>
<td>Solid without bedding</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>Solid with bedding</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>Anaerobic liquid</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>Aerobic liquid</td>
<td>0.25</td>
</tr>
<tr>
<td>Poultry</td>
<td>Deep pit</td>
<td>0.45</td>
</tr>
<tr>
<td></td>
<td>Solid with litter</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>Solid without litter</td>
<td>0.35</td>
</tr>
</tbody>
</table>

Oklahoma


CAFO License
Each facility that is required to obtain and maintain a CAFO license is required to have an animal waste management plan. Land application rates shall take into consideration the plant available nutrient contribution of any land applied animal waste. All soil and waste sampling shall be annually.
Facilities must also develop a pollution prevention plan (PPP) that has soil and waste testing requirements. Soil tests from land application sites shall be performed by an Oklahoma Department of Environmental Quality certified testing laboratory at least annually. Owners of licensed managed feeding operations (LMFO) shall perform soil tests for electrical conductivity, pH, nitrate-nitrogen, ammonium-nitrogen, organic matter, sodium, potassium, calcium, magnesium, available phosphorus, and total nitrogen. All testing shall establish a management record with all costs being paid by the owner.

Sufficient testing of manure shall be required at least every three years and performed by a qualified independent laboratory. All owners of LMFOs shall sample waste retention structure contents annually prior to the first land application of the calendar year. Owners of LMFOs shall sample waste retention structure contents for ammonium-nitrogen, nitrate-nitrogen, total phosphorus, electrical conductivity, pH, sodium, potassium, calcium, magnesium, total nitrogen, and total solids. Other parameters may be required upon request from the Oklahoma Department of Agriculture.

Groundwater testing, nitrogen as nitrate, total phosphorus and fecal coliform bacteria levels must be tested by a certified laboratory at least annually. Testing costs must be paid by owner and will establish a management record.

Table 4.4-8. Estimated ranges of nitrogen availability in animal manure

<table>
<thead>
<tr>
<th>Manure Type</th>
<th>1st Year Availability</th>
<th>Future Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedlot manure</td>
<td>50% - 70%</td>
<td>10% - 20%</td>
</tr>
<tr>
<td>Poultry litter</td>
<td>50% - 70%</td>
<td>10% - 15%</td>
</tr>
<tr>
<td>Dairy manure</td>
<td>50% - 70%</td>
<td>10% - 20%</td>
</tr>
<tr>
<td>Swine lagoon effluent</td>
<td>30% - 50%</td>
<td>5% - 10%</td>
</tr>
</tbody>
</table>

Poultry Operations
Operations not required to obtain a CAFO license and are poultry operations will be required to have an animal waste management plan that contains all nutrient analysis data, including soil and poultry waste testing. Land application rates shall be based on the available nitrogen and phosphorous soil test results.
4.5 Training & Certification Requirements for Manure Applicators

Recommendations:

- Missouri should re-examine its certification requirements (and educational programs) for manure applicators and managers to ensure that they have clear environmental quality benefits.
- It seems unlikely that 10 times as many hours of training are necessary in Missouri as in Iowa. Missouri is the only researched state that requires experience.
- The current certification requirements could lead to a shortage of certified applicators, creating a delay in application activities that could adversely affect environmental quality.
- Less onerous certification requirements might encourage non-class IA operators to obtain the training – presumably improving environmental quality.

Highlights and Impacts:

- Certification requirements vary among states and the water quality connection basis for the variation is not always clear.
- Missouri certifies applicators only on the largest operations (class IA).
- Indiana has no applicator certification requirements.
- Iowa and Oklahoma exempt beef manure applicators.
- Missouri, Iowa and Oklahoma require applicators of poultry litter to be certified.
- Iowa certifies commercial applicators and applicators on mid and large operations handling wet manure systems.
- Missouri has the most stringent training and testing requirements among the four states and is the only state to require prior experience for certification.
- Missouri requires certifying supervisors and applicators whereas other states requiring certification typically require certification of the operator or their supervisor.
- Iowa has the highest fees associated with manure applicator certification. Missouri has the highest indirect cost because it requires the most continuing education.

All operators need to be knowledgeable about record-keeping requirements, calibration of manure application rates, proper setbacks for manure application and soil and weather conditions to avoid when applying manure. Operators of wet manure handling systems also need to know proper monitoring protocols to avoid runoff and prevent spills.

It is assumed that those who know the regulations, standards and processes are more likely to manage manure in a manner that preserves environmental quality. Methods of imparting necessary knowledge and skills include training and testing. Educational training serves the purpose of helping practitioners understand existing standards and regulations. Continuing educational requirements are intended to help practitioners stay current of any regulatory changes and of reminding them of
prior knowledge. Testing may follow training in order to confirm that the necessary material was mastered by the practitioner.

Certification acknowledges a level of knowledge or proficiency gained either by education, experience or both. Presumably certified professionals are better equipped and more likely to comply with regulations and protect water quality. Certified persons are usually given rights and responsibilities that are withheld from persons who have not been certified.

Training requirements and certification gives trained and certified individuals value that can be used to bargain with regulated industries. Certified individuals can obtain jobs that uncertified ones cannot; or charge more for jobs than uncertified persons. Certification requirements can create competitiveness issues if they are too costly, too difficult to obtain or applied inequitably. If the training and certification requirements require experience (as opposed to knowledge and demonstrated proficiency), certified persons can use their bargaining power to increase prices in the short term.

In Missouri, prior experience requirements could hinder new and existing operations from locating qualified applicators. The limited number of people requiring certification and the MDNR management of the program could lead to limited opportunities for training.
Table 4.5-1. Manure applicator certification summary. For more state-specific details, see the appendix.

<table>
<thead>
<tr>
<th>State</th>
<th>Who must be certified</th>
<th>Training requirements</th>
<th>Exam</th>
<th>Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>All applicators and supervisors on class IA operations (≥7000 animal units)</td>
<td>Certification: 0 to 4 years experience and 18 to 30 hrs. course work. Continuing education: 12 to 24 hrs. every 3 years. (administered by MDNR)</td>
<td>Yes</td>
<td>$45 for a 3-yr certificate</td>
</tr>
<tr>
<td>Indiana</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Iowa</td>
<td>Commercial Manure Service Representative</td>
<td>Attend 2-hour course (administered by Extension) every year or test out</td>
<td>Optional, must test or attend training annually.</td>
<td>$200, plus $25 education fee for manager every year</td>
</tr>
<tr>
<td></td>
<td>Confinement operators (≥500 animal units)</td>
<td>Attend 3-hour training (administered by Extension) every year or test out</td>
<td>Optional, must test or attend training annually.</td>
<td>$75, plus $25 education fee every year</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>Poultry litter applicators (private and commercial). Licensed managed feeding operation (LMFO; ≥1000 animal units of swine or poultry and wet manure system)</td>
<td>Certification: 9 hrs. coursework; Continuing education: 3 hrs. coursework annually; (administered by Extension)</td>
<td>No</td>
<td>Private Poultry: $15 for 5-yr certificate if operation is not registered; Commercial Poultry: $15 annually; LMFO: $0</td>
</tr>
</tbody>
</table>
Missouri

Sources: 10 CSR 20-14.010, 10 CSR 20-14.020, 10 CSR 20-14.030

Who must be certified?
All manure applicators and their supervisors on Class IA operations (> 7000 animal units) must be certified. Other operations are exempt unless the Missouri Department of Natural Resources determines personnel need to be certified to protect the waters of the state.

There are three classifications levels for CAFO waste management system operator: A, B or trainee.

- **CAFO supervisor (A certification)** has authority to direct or supervise others applying manure. Must be available by phone or radio and able to arrive at the site during emergencies or abnormal operating situations within 30 minutes.
- **Operator (B certification)** is for someone directly involved in the daily management of the CAFO system and has the authority to manage up to five trainees. During land application activities, a B certified operator must be present and be able to respond to emergencies or abnormal situations within five minutes.
- **Trainee** must perform all duties under the supervision of a certified CAFO operator (B) or supervisor (A).

Requirements and fees

**Supervisors (A certification)**
- Certification requirements:
  1. Four years operating experience (Up to 2.5 years experience can be with equivalent work or training).
  2. 18 hours (dry systems) or 30 hours (wet systems) approved coursework.
  3. Pass an exam.
- Continuing education requirements
  1. Certified for 3 years.
  2. 12 hours (dry systems) or 24 hours (wet systems) of approved coursework to be re-certified.
- Fees
  1. $45 to be certified (once every three years).

**Operator (B)**
- Same as A, but requires one actual year of operating experience.

**Trainee**
- Same as A, but no experience needed and only need to have attempted (not passed) the exam.
Who must be certified?

Commercial manure service
- A sole proprietor or business association engaged in the business of transporting, handling, storing, or applying manure for a fee. Commercial applicators must be certified regardless of source of manure and size of operation.

Commercial manure service representatives
- Is a manager, employee, agent or contractor of a commercial manure service, if the person is engaged in transporting, handling, storing or applying manure on behalf of the service.

Confinement site applicators
- Can be defined as a person who applies manure from a confinement site and is not a commercial applicator. This certification is not needed if the source of manure is from either a small animal feeding operations (< 500 animal units) or open feedlots. Part-time employees or family members of a confinement site applicator and under the direct observation and physically present supervision of a certified confinement site applicator do not need certification.

Requirements and fees

Commercial manure service
- Certification involves passing an exam or attending a two-hour certification-training course each year. Certification is good for one year.
- $200 certification fee plus a $25 education fee for a new or renewal application.
- Commercial applicators must maintain records of manure disposal for a period of three years.

Commercial manure service representative
- Certification involves attending a 3-hour satellite class, 3-hour videotape or passing an applicator exam to become certified.
- $75 certification fee, plus $25 education fee for a new or renewal application.
- Commercial applicators must maintain records of manure disposal for a period of three years.

Confinement site applicators
- Certification involves passing an exam once every three years or attending a two-hour certification-training course each year. Certification is good for three years.
- $100 certification fee for a new or renewal application.
Indiana

Indiana currently does not have any certification or training requirements that manure applicators must follow.

Oklahoma

Sources: OAC 35:17-7-2, OAC 35:17-7-3, OAC 35:17-7-4, 2 O.S. 9-202 B, 2 O.S. 9-205 H.

Who must be certified?
- Commercial poultry waste applicator: any person engaged in commercial land application of more than 10 tons of poultry waste per year. A certified commercial poultry applicator may supervise non-certified employees in land application.
- Private poultry waste applicator: any person who is not a commercial poultry waste applicator but engages in the land application of more than 10 tons of poultry waste per year.
- Licensed managed feeding operation (LMFO): an animal feeding operation that uses primarily liquid waste management system, primarily roofed structure and exceeds 2,500 swine greater than 55 lbs., 10,000 swine less than 55 lbs., 100,000 laying hens or broilers if facility has continuous overflow watering, 30,000 laying hens or broilers if the facility has a liquid manure system or any combination of swine that would equal 1,000 animal units.

Education, not certification, is required of all employees of LMFOs who are responsible for treatment, storage or application of animal waste.

Requirements and fees
Commercial and private poultry waste applicators
- Nine hours of waste management training in the first year, followed by three hours each year after that.
- Applicators must submit an annual report by December 31st of each year that provides information about the litter spread during the previous fiscal year.
- Commercial Applicator: $15 fee for 1-year certification.
- Private Applicator: $15 for 5-year certification. Fee will be waived if the poultry operation is registered with the Oklahoma Department of Agriculture.

Licensed managed feeding operation (LMFO)
- Nine hours of waste management and odor control training in the first year, followed by three hours each year after that.
- No reporting or fees.
4.6 Facility Closure

Recommendations:

Improper lagoon closure has sufficient potential to affect environmental quality so that:

- CAFO operating permits should include lagoon closure plans;
- Missouri should further investigate financial methods to effectively indemnify lagoon closure obligations; and
- Lagoon closure plans and indemnification should not be dependent on whether manure is transported to the lagoon with a flushing (liquid) transport system.

Highlights and Impacts:

- All states expect operations to land apply manure upon closure of confinement operations. Indiana has the fewest requirements for facility closure.
- Indiana is the only state among the four states that does not always require sludge to be removed from lagoons or have some form of indemnity or surety system to assure proper closure.
- Missouri allows the operation to not close a storage facility if it maintains its permit. Iowa and Oklahoma have specific time requirements for completion of closure (less than 1 year).
- Oklahoma is the only state that requires post closure monitoring.
- Iowa collects a non-refundable fee from all operations obtaining a construction permit whereas Missouri collects an indemnity fee during the first 10 years of the operation, which is refunded after successful closure of the lagoon.
- Missouri’s indemnity fund collects funds only from Class IA operations but these funds can be used for the closure of IB and IC manure storages.

Proper closure of a manure storage facility is an important water quality objective. For some systems, such as unagitated lagoons, the cost and the water quality challenges associated with the final cleanout are much greater than the annual costs of operating a lagoon. Many of the nutrients generated by the facility are sequestered in the sludge and accumulate during the lifetime of the manure storage structure. Lagoon closure plans provide a mechanism to help farmers consider how they will cope with the accumulated nutrients.

Closure of facilities that are fully cleaned annually, such as slurry and litter systems, will not incur a large closure expense. Plans and financial security for closure are not as critical for these facilities as for lagoons and earthen manure storages which essentially function as long term nutrient storage.
Oklahoma has the most stringent requirements for lagoon closure. Closure plans require all permitted operations to have a plan that includes a cost estimate. Missouri requires a closure plan for the largest operations that use flushing (liquid transport of manure) system technology associated with lagoons. These plans have the potential to benefit water quality by educating a farmer about the inevitable expenses and logistics of closing their facility.

Three of the four states studied have different methods for assuring proper lagoon closure. This highlights the fact that several different managerial and financial methods exist to insure proper lagoon closure. Appendix 4.7-2 provides brief descriptions of some of these financial methods.

Developing a closure plan will take time and have a significant cost, particularly for lagoon and earthen manure storage basins. Relevant plans will need to be updated over the life of the structure to keep up with changes in technology and availability of land for the application of the stored manure nutrients over the typical 20-year life of these manure storage and treatment facilities. Alternatively, the initial plan could be structured more as an educational document so the farmer knows the challenges that must be addressed in closing the facility in the future.

Lagoon sludge materials are rich in nutrients, particularly phosphorus. For this reason, care must be exercised when applying sludge to land so that water quality is not compromised. All of the states studied may eventually require additional regulations to assure that sludge materials are applied in a manner that always protects water quality.

<table>
<thead>
<tr>
<th>State</th>
<th>Closure plan required</th>
<th>Time requirement</th>
<th>Lagoon sludge</th>
<th>Closure assurance funds</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>Yes, Class IA only</td>
<td>No, must maintain permit until storage facility closed</td>
<td>Must remove</td>
<td>Refundable Indemnity fund, Class IA only</td>
<td>&gt; $7,000 (Refundable)</td>
</tr>
<tr>
<td>Iowa</td>
<td>No</td>
<td>6 months</td>
<td>Must remove</td>
<td>Non-refundable indemnity fund, most confinement operations</td>
<td>0 to $600</td>
</tr>
<tr>
<td>Indiana</td>
<td>No</td>
<td>No, must certify closure</td>
<td>No requirement</td>
<td>None</td>
<td>N/A</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>Yes, all CAFOs</td>
<td>1 year</td>
<td>Must remove</td>
<td>Assure minimum assets</td>
<td>$10,000 to $50,000</td>
</tr>
</tbody>
</table>
Appendix 4.6-1: State-by-state summary

Missouri

Source: 10 CSR 20-6.300(4)(A)1, RSMO 640.745 and 10 CSR 20-6.300(5)(D)

Closure Requirements

• Class I CAFOs (>1000 animal units) must maintain a valid operating permit until all lagoons and waste storage structures are properly closed according to a closure plan approved by MDNR.
  1. Closure plan must include removal of wastewater and sludge.
  2. After wastewater and sludge removal, earthen storages can be left in place as a pond or the berms can be destroyed and the site graded and revegetated.

• Class II CAFOs (300 to 999 animal units) can maintain lagoons and waste storage structures in a manner that allows no discharges to the waters of the state. Closure requirements include:
  1. Removal of wastewater and sludge.
  2. After wastewater and sludge removal, earthen storages can be left in place as a pond or the berms can be destroyed and the site graded and revegetated.

Closure assurance funds

• Class IA CAFOs (>7000 animal units) with flush systems must contribute $0.10 per animal unit annually for 10 years to the “CAFO Indemnity Fund”. The fund is used to insure the current owner properly closes the lagoon. The fees are refunded after proper closure of the lagoon.
  1. The fund can be used to fund closure of class IA, class IB, class IC and class II animal feeding operation wastewater lagoons that have been placed in the control of the state, a county, or municipal government, or an agency thereof, through donation, purchase, tax delinquency, foreclosure, default or settlement, including conveyance by deed in lieu of foreclosure, and pose a threat to human health, the environment, or a threat to groundwater.
  2. The state, county, or municipal government, or an agency has to make reasonable and prudent efforts to sell said property to a qualifying purchaser before funds from the indemnity fund can be utilized.
Iowa

Source: IAC 567-65.2(8), IC 459.502, 459.503, IDNR Manure Fee Forms

Closure requirements
Iowa requires all animal feeding operations land apply all manure from their manure control facilities no more than 6 months after the use of an animal feeding operation is discontinued.

Closure assurance funds
Iowa administers a manure storage indemnity fee for new or expanding confined feeding operations that is used for the exclusive purpose of providing moneys for cleanup of abandoned facilities.

- All operations confining animals in roofed structures and all operations requiring a construction permit must contribute to the fund. Operations obtaining construction permits pay the fee as part of the construction permitting process.
- The fee varies depending on operation size and animal type.
- The fee is not refunded.

Table 4.6-2. Summary of indemnity fees for Iowa confined feeding operations.

<table>
<thead>
<tr>
<th>Animal class</th>
<th>Animal Units (AU)</th>
<th>$/AU</th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poultry</td>
<td>0 to 999</td>
<td>0.04</td>
<td>0 to 40</td>
</tr>
<tr>
<td></td>
<td>1000 to 2999</td>
<td>0.06</td>
<td>60 to 180</td>
</tr>
<tr>
<td></td>
<td>&gt;3000</td>
<td>0.08</td>
<td>&gt;240</td>
</tr>
<tr>
<td>Others</td>
<td>0 to 999</td>
<td>0.10</td>
<td>0 to 100</td>
</tr>
<tr>
<td></td>
<td>1000 to 2999</td>
<td>0.15</td>
<td>150 to 450</td>
</tr>
<tr>
<td></td>
<td>&gt;3000</td>
<td>0.20</td>
<td>&gt;600</td>
</tr>
</tbody>
</table>

Indiana

Source: 327 IAC 16-11-3(c-e)

Closure requirements
All operations with more than 300 cattle, 600 sheep or swine or 30,000 fowl in confinement ("confined feeding operations" CFOs)) have the following closure requirements.

- All manure must be removed from manure storage structure and properly land applied in accordance with applicable state and federal laws.
- Confined feeding operations shall have all associated appurtenances and conveyance structures removed from uncovered liquid manure storage structures.
- Dewatering, sludge removal and removal of the berms and re-vegetation of the site are not generally required unless deemed necessary to protect human health or the environment.
- Within 30 days after completing closure, the facility must submit a certification to the commissioner.
- If deemed necessary to protect human health or the environment, commissioner may require additional closure activities.

Closure assurance funds
None

Oklahoma

Source: OAC 35:17-3-25(b-f), 2 O.S. 9-209.1

Closure requirements
All concentrated animal feeding operations (CAFOs; ≥1000 animal units) must submit a closure plan as part of the CAFO license permit application that includes a written estimate of the cost of hiring an independent third party to decommission each waste retention structure.
- Closure of all retention structures shall commence within 6 months and be completed within 1 year of cessation of operations.
- Sludge from the bottom of the waste retention structure shall be removed without compromising the integrity of the liner.
- Wastewater and sludge may be land applied according to department rules.
- Solids must be removed and disposed of in an environmentally safe manner.
- A post-closure monitoring system shall be conducted for a period of at least 3 years.
- A certificate of post closure performance shall be submitted to the department at the end of the closure period. Professional engineer must sign certificate.

Closure assurance funds
Oklahoma requires that a financial statement must accompany the CAFO license application that will include a liquid waste management structure. These operations must prove that they have the financial ability to close the waste facilities. There are two different types of financial proof that Oklahoma Department of Agriculture can require:
- Category A surety is a financial statement listing assets and liabilities proving a net worth of not less than:
  1. 300 to 1000 animal units - $10,000
  2. 1001 to 2000 animal units - $25,000
  3. >2000 animal units - $50,000
- Category B surety includes irrevocable commercial letter of credit, cash, a cashier’s check, CD, Bank Joint Custody Receipt, other negotiable instrument or a blanket surety bond. Amounts of surety are the same as Category A.
An animal feeding operation, which doesn’t have any outstanding contempt citations or fines may post Category A surety. Otherwise, the operation must post Category B surety.

Oklahoma Department of Agriculture, after a notice and hearing, may require additional Category B surety for good cause concerning pollution in an amount greater than $25,000, but not to exceed five times the number of animal units for the facility being licensed.
Appendix 4.6-2: Facility Closure Options

Several different financial methods of indemnifying businesses with a large facility retirement obligation exist. Six of them are briefly discussed below. Any one of these could be used by a business or mandated by a regulatory agency. They can also be used in combinations. Each has its own strengths and weaknesses. Not all are necessarily appropriate for insuring proper lagoon closure.

1) Maintain permit until the lagoon is properly closed.
   - Description – permitted operations would be required to maintain their permit (and manage according to it) until the lagoon is properly closed, even if livestock production has ceased at the facility.
   - Pros – insures that the facility will be managed according to permit requirements designed to protect environmental quality.
   - Cons – the risk of mismanagement or catastrophic event that can affect environmental quality remains.

2) Non-refundable sinking fund.
   - Description – all or specified facilities contribute to a general fund that is drawn upon when a facility abandons their lagoon without proper closure. The contributing businesses access the fund only through default procedures.
   - Pros – pooling of resources to be used only in abandonment/bankruptcy situations.
   - Cons – provides incentives for businesses to not plan for closure; account may be under-funded if businesses have general economic downturn or fail to plan for closure expenses.

3) Refundable sinking fund.
   - Description – all or specified facilities contribute to a general fund that is drawn upon when a facility abandons their lagoon without proper closure. The contributing businesses receive their contributions back upon successfully closing their lagoon.
   - Pros – pooling of resources to be used only in abandonment/bankruptcy situations; opportunity to receive money back upon proper closure of lagoon reduces the incentive (relative to non-refundable sinking funds) for not planning.
   - Cons – account may be under-funded if businesses have general economic downturn or fail to plan for closure expenses.

4) CD or designated savings account.
   - Description – similar to a sinking fund except that the CAFO operator maintains ownership of the funds at all times. The use of the funds is limited to lagoon closure until the obligation is met.
   - Pros – the CAFO owner maintains ownership of all funds designated for the lagoon closure. The CAFO owner is obligated to make periodic payments or maintain a minimum amount showing the ability to properly close the lagoon.
• Cons – In the event that the financial strength of the CAFO is insufficient to properly close the lagoon, no other “general fund” is available to complete the task.

5) License and Permit Bond.
• Description – a legal instrument where an independent 3rd party guarantees that the lagoon will be properly closed. The CAFO operator would pay the bonding company a fee or premium to guarantee a certain dollar value will be guaranteed for lagoon closing.
• Pros – provides the greatest guarantee that the money for closure will be available when it is needed.
• Cons – could be the most expensive method for the CAFO.

6) Financial Test.
• Description – the CAFO would be required to submit documentation showing that their financial strength (net worth and liquidity) are sufficiently strong that they are unlikely to abandon the facility without properly closing the lagoon.
• Pros – least expensive for the CAFO.
• Cons – financial position changes over time. The 20 year time horizon of lagoon closure concern may be too long for proper use. Requiring the financial test every time the permit is renewed takes away some of this risk.
4.7 Mortality Management

Recommendations:
Continue use of composting as an approved method of animal mortality disposal. Create incentives that encourage improved management and operation of these mortality composters. This is especially important since rendering is likely to continually become less accessible.

Present methods of animal mortality management do not appear to affect economic competitiveness in Missouri. Regulations that limit burial loading rates are in areas with sensitive groundwater issues and are implemented to protect groundwater.

Highlights and Impacts:
Proper disposal of dead animal carcasses is necessary to prevent spread of disease and contamination of ground water. A number of methods for mortality disposal exist, and the states in this study maintain an array of requirements for separation distances, permits, and design specifications for mortality management facilities.

- Oklahoma is the only state in this study requiring an animal mortality disposal plan.
- Oklahoma does not allow for burial of animals as a method of disposal unless no other alternative exists.
- Iowa and Missouri have the strictest requirements for depth of burial and carcass loading per acre. Missouri animal burial regulations are more restrictive than in Iowa. There is a lower loading rate in areas where there is an increased potential for groundwater contamination.
- Composting is an acceptable carcass disposal method in all four states studied. Oklahoma requires approval from the department prior to composting carcasses. Missouri requires that mortality composting be included in the permit for Class IB and larger operations.
- Missouri has no permit requirements for composting facilities at Class IC and smaller operations if the composting and materials storage are located in an enclosed building, or if the composting facility covers less than 5000 square feet and is underlain with an impermeable layer and raw materials are covered by a tarp or impermeable cover. Iowa and Indiana both specify design considerations for controlling leachate and storm water contact with mortality compost.
- Incineration is allowed for carcass disposal in all four states within the study. Missouri has specific design requirements, but no permit requirement. Oklahoma requires an air quality permit.
Missouri has been a leader in developing composting procedures for large animal mortalities. This likely occurred because rendering has not been available to large areas of the state for some years.

All animal production facility operators need to be knowledgeable about dead animal disposal methods to ensure public health and safety. Proper design and management of composting facilities is necessary to ensure complete destruction of carcass material and pathogens. Knowledge of proper burial techniques is important to protect ground and surface waters and to control scavenging of carcasses by other animals.

Permitting of mortality composting facilities and incinerators can allow for control of the design of such facilities by the regulatory agency. Permitting requirements can create competitiveness issues if required designs are too costly to construct, compliance with permit requirements is too difficult or requirements are applied inequitably to different sizes and types of operations.

Table 4.7-1. Comparison of accepted methods of dead animal disposal.

<table>
<thead>
<tr>
<th>State</th>
<th>Acceptable Methods</th>
<th>Additional Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>MO</td>
<td>Burial, rendering, composting, incineration, landfill</td>
<td>Disposal required within 24 hours of knowledge of death of animal(s)</td>
</tr>
<tr>
<td>IA</td>
<td>Burial, rendering, composting, incineration</td>
<td>Disposal required within 24 hours of knowledge of death of animal(s)</td>
</tr>
<tr>
<td>IN</td>
<td>Burial, rendering, composting, incineration</td>
<td>Disposal required within 24 hours of knowledge of death of animal(s)</td>
</tr>
<tr>
<td>OK</td>
<td>Burial, rendering, composting, incineration</td>
<td>Mortality disposal plan required as part of an odor abatement plan for LFMOs. Storage facilities must have lids or be sealed when carcasses are stored prior to transport to a rendering plant</td>
</tr>
</tbody>
</table>
Appendix 4.7-1: State-by-state summary

Missouri


Current law requires that the body of an animal that has died be properly disposed of within 24 hours after knowledge of the death. No body of any animal shall be buried, burned, cooked, or otherwise disposed of, except as provided for in the statute.

Acceptable methods of carcass disposal include:

- Burial, with the following stipulations.
  1. The lowest elevation may not be more than 6 feet below the surface of the ground.
  2. The dead animals shall be immediately covered with a minimum of 6 inches of soil and a final cover of a minimum of 30 inches of soil.
  3. Maximum loading rates with groundwater contamination potential, 1 cow, 6 swine, 7 sheep, 300 poultry, 70 turkeys, or 1000 lbs. of other species or immature animals per acre per year; Otherwise, 7 cattle, 45 swine, 47 sheep, 2000 poultry, 400 turkeys, or 7000 lbs. other species or immature animals per acre per year.
  4. Mortality burial locations should be separated from sensitive areas by the following specifications.
     o At least 300 feet from any wells, surface water intake structures, public water supply lakes, springs or sinkholes.
     o More than 100 feet from any body of surface water such as a stream, lake, pond, or intermittent stream.
     o At least 50 feet from adjacent property line.
     o At least 300 feet from any existing neighboring residence.

- Rendering

- Composting, with the following stipulations.
  1. Permitting is required for Class IB or larger operations. Permitting is not required for Class IC if certain conditions are met.
  2. Composting locations should be separated from sensitive areas according to the following specifications.
     o 300 feet well setback from animal composting facilities except for 100 feet well setback for poultry, bird composting facility with concrete floor design covered with roof and dry litter storage within a poultry building.
  3. Class IC or smaller operating without a permit must compost:
     o In area smaller than 5,000 square feet and cover materials with tarp or impermeable cover;
     o In an enclosed building (with roof).
4. Class IC or smaller facilities operating without a permit must compost on an impermeable floor.

- Incineration, with the following stipulation.
  1. Non-commercial incinerators must be designed, constructed, and operated in an efficient manner, as recommended by University of Missouri Extension service.

- Disposal in an approved sanitary landfill

---

**Iowa**

*Source: IC 167.12, IAC 567-101.3(1)(b)(4-5), IAC 567-101.3(1), 567-105.1(2)(b), IAC 567-105.3, IAC 567-105.6*

Current law requires that the body of an animal that has died be properly disposed of within 24 hours after knowledge of the death. Acceptable methods of carcass disposal include:

- Burial, with the following stipulations.
  1. The lowest elevation may not be more than 6 feet below the surface of the ground.
  2. Dead animals are immediately covered with a minimum of 6 inches of soil and finally covered with a minimum of 30 inches of soil.
  3. Maximum loading rates of 7 slaughter and feeder cattle, 44 swine (butcher and breeding), 73 sheep or lambs, 400 poultry or turkeys, or 2 carcasses per acres for other species. Animals which die within two months of birth may be buried without regard to number.
  4. Mortality burial locations should be separated from sensitive areas by the following specifications.
     - At least 100 feet from any private well and 200 feet from any public well.
     - More than 100 feet from any body of water.
     - Outside of a floodplain, wetland, or shoreline area.
     - 50 feet from adjacent property line.
     - 500 feet from neighboring residence.

- Composting, with the following stipulations.
  1. On-farm composting is allowed and does not require a facility-specific permit if the following requirements from 567-105.3 and 567-105.6 are met.
     - 500 feet from existing inhabited residence, not including owner/operator of composting facility.
     - 100 feet for private wells.
     - 200 feet for public wells.
     - 100 feet from flowing or intermittent streams, lakes or ponds.
     - 50 feet from property line.
     - Must be done outside of wetlands or 100-year flood plain.
Measures shall be taken to prevent water from running onto the facility from adjacent land and to prevent compost leachate and runoff from leaving the composting facility.

Facilities shall be designed, constructed, and maintained so as to minimize ponding of water or liquids. Ponding that does occur must be addressed within 48 hours.

Composting must be done on an all-weather surface of compacted soil, compacted granular aggregates, asphalt, concrete or similar relatively impermeable material.

Dead farm animals are incorporated into the composting process within 24 hours of death and sufficiently covered with agricultural waste, compost, straw and clean wood waste, which is necessary as a bulking agent, to prevent access by domestic or wild animals.

**Incineration**

**Indiana**

*Source: 345 IAC 7-7-3(a)(2), 345 IAC 7-7-3(a)(1)(5), 345 IAC 7-7-3(a)(4), 327 IAC 16-9-3(a), 345 IAC 7-7-3.5(C), 345 IAC 7-7-3.5(a)(1)(A-B), 345 IAC 7-7-3(a)(3), IC 15-2.1-16-20*

Any animal body shall be disposed of by the person within twenty-four (24) hours after knowledge of death so as not to produce a nuisance. Mortalities must be disposed by licensed disposal plant, burial, incineration or composting.

Acceptable methods of carcass disposal include:

- **Burial**, with the following stipulations.
  1. The carcass is buried on the owner’s property to a depth of 4 feet or more with covering of earth in addition to any other materials that may be used for covering.
  2. Loading rates for animals per acre are not stated in the regulations.

- **Rendering**, with the following stipulations
  1. Removal to a licensed disposal plant or by sale to a plant producing pet food under permit by the state veterinarian is acceptable.

- **Composting**, with the following stipulations.
  1. Dead animal composting operations must have run-on and run-off control.
  2. Leachate run-off must be prevented and controlled.
  3. Domestic animals are kept from accessing the compost pile and rodents and other wild animals are controlled so they do not disrupt the compost pile or create a health hazard to humans or animals.

- **Incineration**
An odor abatement plan (OAP) shall be prepared for each LMFO and submitted as a part of the CAFO license application. Within the OAP, carcass disposal plans are required.

For poultry operations, a mortality disposal plan is required with the animal waste management plan.

The mortality disposal plan shall include provisions for the disposal of carcasses associated with normal mortality and shall include provisions for emergency disposal when a major disease outbreak or other emergency results in deaths significantly higher than normal mortality rates.

Storage facilities must have lids or be sealed when carcasses are stored prior to transport to a rendering plant.

Methods [of mortality disposal] must be described in the mortality disposal plan and the disposal plan must address the reduction of odors.

The maximum storage limit rule requires that for “animals dying of any contagious or infectious disease,” one is “either to burn the carcass thereof or bury the same within twenty-four (24) hours after death is discovered.”

The carcass of any animal may not be disposed of in any well, pond, spring or stream of water. Disposal that is within 1/4 mile of any occupied dwelling or of any public highway is not allowed unless the carcass has been properly buried.

Acceptable methods of carcass disposal include:

- Burial, with the following stipulations
  - Burial shall only be allowed as a method of carcass disposal if no reasonable alternative exists and the disposal plan contains specific measures and practices which are utilized to protect the ground and surface waters of the state.
  - No part of the carcass may be closer than 2 1/2 feet to the surface of the soil if died from contagious or infectious disease.
  - Loading rates for animals per acre are not stated in the regulations.
  - In no event shall burial be used by an LMFO unless the burial area meets the requirements of an Animal Waste Management System, including but not limited to the use of liners.

- Rendering, with the following stipulations
  - For poultry, disposal of carcasses must occur within a reasonable amount of time.
• For all other species, the facility must obtain a contract with a rendering service that insures disposal of all carcasses within a reasonable period of time.

  ▪ Composting, with the following stipulations
  • Composting is acceptable with prior approval. The Department may require another method of carcass disposal other than composting if the Department determines that a more feasible and effective method of carcass disposal exists.
  • Poultry composting methods must be approved by department.
  • A scavenger control plan is not required with carcass disposal requirements; however, a pest management plan (PMP) for the entire facility is required. The PMP shall provide specific methods for preventing pests, including but not limited to flies, rodents, and coyotes.

  ▪ Incineration, with the following stipulations
  • For all species, incineration shall only be used as method of carcass disposal if the animal feeding operation has a valid air quality permit from the Oklahoma Department of Environmental Quality, Air Quality Division.
Chapter 5: 
Local Restrictions on Animal Feeding Operations

Recommendations:

- Missouri should create and maintain a central clearinghouse where local and state entities would be required to post any regional restrictions that are stricter than statewide requirements.

- We recommend efforts to insure that regional restrictions clearly benefit water quality and public health:
  - Entities creating local controls more stringent than state regulations should be required to state the specific mechanism by which the rule will protect water quality and/or public health.
  - The state should provide resources and support mechanisms that provide local stakeholders the information they need to make an educated decision on local limits.
  - Existing permitted operations should receive grandfather protection from local changes.

The concept of uniform statewide limits on regulations is already irrelevant. In Missouri there are already at least three sources of more stringent controls in an area than currently required by state regulations. These are county and township ordinances and zoning, state designation of sensitive waters, and federally mandated designation of impaired waters.

There is a water quality basis for more stringent controls in at least some of these designated areas. Some of our water resources are more sensitive to pollutants, some have higher value (e.g. drinking water), and some are more impaired. It is rational that all waters of the state are not held to the same water quality standards. By extension, it is expected that restrictions on animal feeding operations will not be the same in all watersheds.

Local limits are derived from three different processes in Missouri.
- Critical watersheds are watersheds designated by state regulation to need additional limitations and, in some cases, restrictions on building the largest operations. Critical watersheds include drinking watersheds and some of the most sensitive recreational water resources in the state. They represent a situation where the state legislature has set state water quality goals have superceded business competitiveness issues. These watersheds cover 22% of the state land area and 17% of the permitted operations are in critical watersheds.
• Impaired watersheds are mandated by the federal government through the Clean Water Act to have local stakeholders develop protection plans with the technical support of Missouri Department of Natural Resources. The program, as a national program, affects all states, not just Missouri reducing the competitive impact on Missouri. They represent a situation where state and federal standards have been used to identify a problem and stipulated that local citizens develop a response. Agriculture related impaired watersheds cover 7% of state land area and contain 24% of permitted operations.

• Local county or township limits are derived from zoning or public health jurisdiction. There is no formal process or technical support for locations developing such limits. Limits promulgated under zoning and public health restrictions tend to have the most arbitrary limits on animal feeding operations. In many cases they have clear negative impacts on competitiveness but no clear connection to preserving water quality or public health. Consequently local control is an area particularly fraught with controversy. These restrictions in eight Missouri counties affect 12% of existing permitted operations.

Our first recommendation for an information clearinghouse seeks to insure that information on local and watershed limits is easily available to all potential business investors. This will promote a positive business climate by assuring investors that they are fully aware of the potential limits on animal feeding operations as they compare locations. It will also promote water quality by helping investors seek out optimal locations for those operations.

Our second set of recommendations in this area seeks to promote implementation of science-based rules by local entities and discourage the most punitive aspects of local rulemaking. Asking purveyors of local rules to clearly state the water quality or public health basis of each rule would help insure there is a connection between proposed rules and fees and their intended objectives. Local entities do not always have the resources or the awareness of resources available to develop a clear scientific basis for proposed rules. The lack of technical support to the local rulemaking process may be one of the reasons for the lack of a clear water quality basis for some of these rules. Any support the state can provide to watersheds, counties, and townships undergoing a local rulemaking process should help insure the rule will meet water quality goals.

Grandfathering requirements for existing operations is an important element of local rulemaking. It prevents punitive rules aimed at driving out existing businesses. There is a large difference between a process that convinces a new investor not to initiate an enterprise because of local restrictions versus forcing an existing operation out of business or to incur a large expense due to rules imposed after permitting of the operation.

We did not specifically endorse a legislative limit on the ability of counties to create local limits. Such legislation is attractive because of the clear objective of many of these local limits to severely hamper business competitiveness. However loss of
this mechanism eliminates the opportunity for local control, an important element of environmental protection. Banning local ordinances is neutral or positive for business but neutral or negative for water quality. Our alternative recommendation preserves some options for local control while promoting more technically sound rule making at the local level.
5.1 Local Ordinances and Animal Feeding Operations

The following analysis includes the most comprehensive collection of available information on township and county ordinances and zoning restriction currently in effect in Missouri.

Highlights and Impacts:

- Iowa is the only state among the four surveyed that specifically limits local governments setting county-based fees or more restrictive standards than state limits.
- Indiana and Missouri, the two states with significant local limits, have no statewide central clearinghouse for this information. You need to contact authorities in each county and township to determine local limits.
- Missouri has the most far-reaching local controls. Counties have used health ordinances and zoning restrictions to charge additional fees, create county indemnity funds, require permitting of smaller operations, expand setbacks and limit animal numbers.
- In many cases Missouri county or township ordinances clearly limit the ability of existing operations to expand and serve as a deterrent to new operations.

Table 5.1-1. Summary of local restrictions on animal feeding operations (AFOs).

<table>
<thead>
<tr>
<th>State</th>
<th>State law(s) specifically limiting county AFO rules?</th>
<th>Significant local limits on AFOs that exceed state standards?</th>
<th>Local control mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>No</td>
<td>Yes</td>
<td>County Health ordinance, County or township zoning</td>
</tr>
<tr>
<td>Iowa</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>Indiana</td>
<td>No</td>
<td>Yes</td>
<td>County zoning</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>No</td>
<td>No</td>
<td>N/A</td>
</tr>
</tbody>
</table>

County restrictions create significant uncertainty for animal feeding operations in two ways:

- Existing operations have no assurance that local rules will not be modified to prevent continued operation of current facilities, expansion or new construction.
- Ignorance of local rules is likely because there is no central location to determine where county or township limits are important.

In some cases Missouri limits clearly have the objective of limiting or eliminating further expansion or new construction of animal feeding facilities.

- Camden County requires no application of manure from wet handling facilities within 5 miles of Lake of the Ozarks.
- Henry County requires operations with 1,000 animal units to pay $6,000 in construction and related permits to the county.
• Platte County requires posting a surety bond of up to $150,000.

County ordinances provide an opportunity for local entities to address gaps in state rules or address local concerns. Missouri statutes limit the use of county zoning to impose restrictions on locating buildings. County health ordinances may exceed their purview if they attempt to “zone” agricultural activities. The legality of specific restrictions using health or zoning ordinances is still being clarified through case law.
Appendix 5.1: State-by-state summary

Missouri

Missouri local governments have imposed additional requirements and fees on animal feeding operations. Two strategies have been used to justify local limits and fees.

- County health ordinances to regulate agricultural activities under the authority of RSMO 192.300.
- Zoning ordinances.

There are no statewide resources listing counties and townships using these strategies to impose additional regulation on animal feeding operations. We have located eight counties that have enacted health ordinances and eight townships and one county that have enacted zoning restrictions affecting concentrated animal feeding operations.

Figure 1. Missouri counties known to have county health ordinances or zoning restrictions on animal feeding operations or counties containing townships with zoning restrictions on animal feeding operations.
The scope of the ordinances and zoning restrictions can be quite broad. Tables 2 and 3 summarize examples where health and zoning ordinances impose local requirements or fees that exceed state requirements. Typically, there is a lot of similarity among many of the county health ordinances. For example, the health ordinances in Harrison and Livingston counties have identical wording.
Table 5.1-2. Summary of Missouri county health ordinances that impose additional restrictions on animal feeding operations.

<table>
<thead>
<tr>
<th>County</th>
<th>Classification of CAFO</th>
<th>Air Quality Restrictions</th>
<th>Land Required for Operation</th>
<th>Slope Restrictions for Land Application</th>
<th>Land Application Setbacks</th>
<th>Facility Setbacks</th>
<th>Lagoon or Feedlot Setbacks</th>
<th>Other Setbacks</th>
<th>County Fees</th>
<th>Financial Security</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caldwell</td>
<td>≥ 300 AU</td>
<td>Yes</td>
<td>1 ac. per 4 AU-wet system; 1 acre per 8 AU-dry system, continuous land tract for wet system</td>
<td>Not greater than 10 % slope</td>
<td>100-1000 feet for dwelling, public areas, sinkholes, strip pits, wells, springs, streams, water supply sources</td>
<td>½ - 1 mile from another CAFO</td>
<td>2000 feet from an existing residence</td>
<td>1000 feet to 2 mile from a CAFO to a occupied dwelling or populated area, increase ¼ mile per 500 AU over 2000 AU</td>
<td>$1000-10,000</td>
<td>$30,000-$70,000 cash or surety bond; Extra $20,000 per 500 AU over 2000</td>
</tr>
<tr>
<td>Camden</td>
<td>&gt; 250 AU</td>
<td>Yes</td>
<td>1 ac. per 4 AU-wet system; 1 acre per 8 AU-dry system</td>
<td>Not greater than 10 % slope</td>
<td>½ -5 mile setbacks from dwelling, lagoons, sinkholes, coves, human supply structures, water sources</td>
<td>½ -2 miles from another CAFO</td>
<td>1-5 miles from dwellings, public areas, water supply sources</td>
<td>None</td>
<td>$1 per AU original and annual renewal for a permit</td>
<td>$100 per AU, cash or surety bond</td>
</tr>
<tr>
<td>Harrison</td>
<td>≥ 300 AU</td>
<td>Yes</td>
<td>1 ac. per 4 AU-wet system; 1 acre per 8 AU-dry system</td>
<td>Not greater than 10 % slope</td>
<td>100-1000 feet for dwelling, public areas, sinkholes, strip pits, wells, springs, streams, water supply sources</td>
<td>¼ -1 mile from another CAFO</td>
<td>1000-3000 feet from public building or dwelling</td>
<td>100 feet from property line, public use area or conservation area</td>
<td>$1000-10,000</td>
<td>$15,000-$100,000 cash or surety bond</td>
</tr>
<tr>
<td>Henry</td>
<td>≥ 1000 AU</td>
<td>Yes</td>
<td>None</td>
<td>None</td>
<td>300-1000 feet from property lines, dwellings, buildings, water sources</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Original or renewal fee is $0.71 per AU; Permit fees range from $6,000 to $12,500</td>
<td>None</td>
</tr>
<tr>
<td>Linn</td>
<td>≥ 300 AU</td>
<td>Yes</td>
<td>1 ac. per 4 AU-wet system; 1 acre per 8 AU-dry system, continuous land tract for wet system</td>
<td>Not greater than 10 % slope</td>
<td>100-1000 feet for dwelling, public areas, sinkholes, strip pits, wells, springs, streams, water supply sources</td>
<td>½ - 1 mile from another CAFO</td>
<td>None</td>
<td>1000 feet to ½ mile from a CAFO to a occupied dwelling, increase ¼ mile per 500 AU over 2000 AU</td>
<td>$1000-10,000</td>
<td>$30,000-$70,000 cash or surety bond; Extra $20,000 per 500 AU over 2000</td>
</tr>
<tr>
<td>Livingston</td>
<td>≥ 300 AU</td>
<td>Yes</td>
<td>1 ac. per 4 AU-wet system; 1 acre per 8 AU-dry system</td>
<td>Not greater than 10 % slope</td>
<td>100-1000 feet for dwelling, public areas, sinkholes, strip pits, wells, springs, streams, water supply sources</td>
<td>¼ - 1 mile from another CAFO</td>
<td>1000-3000 feet for public building or dwelling</td>
<td>100 feet from property line, public use area or conservation area</td>
<td>$1000-10,000</td>
<td>$15,000-$100,000 cash or surety bond</td>
</tr>
<tr>
<td>Pettis</td>
<td>≥ 300 AU</td>
<td>No</td>
<td>1 ac. per 4 AU-wet system; 1 acre per 8 AU-dry system, continuous land tract for wet system</td>
<td>Not greater than 10 % slope</td>
<td>50 feet to ¼ mile from dwellings, sinkholes, strip pits, water sources</td>
<td>¼ - 1 mile from another CAFO</td>
<td>None</td>
<td>1000 feet to ½ mile from a CAFO to a occupied dwelling, increase ¼ mile per 500 AU over 2000 AU</td>
<td>$5 for permit</td>
<td>None</td>
</tr>
<tr>
<td>Platte</td>
<td>≥ 300 AU</td>
<td>Yes</td>
<td>1 ac. per 4 AU-wet system; 1 acre per 8 AU-dry system</td>
<td>Not greater than 10 % slope</td>
<td>100-1000 feet for dwelling, public areas, sinkholes, strip pits, wells, springs, streams, water supply sources</td>
<td>¼ - 1 ½ mile from another CAFO, increase ¼ mile each 500 AU over 7000 AU</td>
<td>None</td>
<td>1-2 mile from populated area, increase ¼ mile for each 500 AU over 7,000 AU</td>
<td>$1000-10,000; $1 per AU over 10,000 AU; Renewal is $100-500</td>
<td>$1,000-$150,000 surety bonds or insurance; $20,000 extra each 500 AU over 7,000 AU</td>
</tr>
</tbody>
</table>
Table 5.1-3. Summary of Missouri zoning ordinances that impose additional restrictions on animal feeding operations.

<table>
<thead>
<tr>
<th>County or Township</th>
<th>Has restrictions of livestock to certain districts</th>
<th>Maximum Concentration of Animals in Township or County</th>
<th>Setbacks</th>
<th>County or Township Fees</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cass County</td>
<td>Yes</td>
<td>None</td>
<td>None</td>
<td>Special Use Permit may be required; $10,000 for commercial feedlot</td>
<td>CAFOs subject to site plan review</td>
</tr>
<tr>
<td>Colfax Township- Dekalb County</td>
<td>Yes</td>
<td>None</td>
<td>Confinement buildings and sewage disposal systems must be at least ½ mile from the nearest residence</td>
<td>None</td>
<td>Must have an anaerobic lagoon system</td>
</tr>
<tr>
<td>Honey Creek Township- Henry County</td>
<td>Yes</td>
<td>500 confined cattle or sheep per 160 acres and/or 2000 per 640 acres; 1500 confined hogs per 160 acres and/or 6000 per 640 acres; 20,000 confined poultry per 160 acres and/or 80,000 per 640 acres</td>
<td>CAFOs with ≥ 4000 poultry; ≥ 250 cattle or sheep; or ≥ 1100 hogs must have 4000 residential district and outside a 1000 feet radius from other landowners.</td>
<td>$25,000 cash or surety bond for 10 acre/foot lagoon. Each acre/foot above requires an additional $25,000</td>
<td>None</td>
</tr>
<tr>
<td>Lincoln Township- Putnam County</td>
<td>Yes</td>
<td>None</td>
<td>Lagoons and feedlots must be 1400-5280 feet from residence, depending on lagoon size; 300-1000 feet from certain water sources; and 100 feet from public roadway</td>
<td>$25,000 cash or surety bond for 10 acre/foot lagoon. Each acre/foot above requires an additional $25,000</td>
<td>Installation of monitoring wells, Air Quality Restrictions</td>
</tr>
<tr>
<td>Sherman Township- Putnam County</td>
<td>Yes</td>
<td>None</td>
<td>Lagoons and feedlots must be 1400-5280 feet from residence, depending on lagoon size.</td>
<td>$25,000 cash or surety bond for 10 acre/foot lagoon. Each acre/foot above requires an additional $25,000</td>
<td>None</td>
</tr>
<tr>
<td>Tebo Township- Henry County</td>
<td>Yes</td>
<td>500 confined cattle or sheep per 160 acres and/or 2000 per 640 acres; 1500 confined hogs per 160 acres and/or 6000 per 640 acres; 20,000 confined poultry per 160 acres and/or 80,000 per 640 acres</td>
<td>CAFOs with ≥ 4000 poultry; ≥ 250 cattle or sheep; or ≥ 1100 hogs must have 4000 residential district and outside a 1000 feet radius from other landowners.</td>
<td>$25,000 cash or surety bond for 10 acre/foot lagoon. Each acre/foot above requires an additional $25,000</td>
<td>None</td>
</tr>
<tr>
<td>Walker Township- Henry County</td>
<td>Yes</td>
<td>500 confined cattle or sheep per 160 acres and/or 2000 per 640 acres; 1500 confined hogs per 160 acres and/or 6000 per 640 acres; 20,000 confined poultry per 160 acres and/or 80,000 per 640 acres</td>
<td>CAFOs with ≥ 4000 poultry; ≥ 250 cattle or sheep; or ≥ 1100 hogs must have 4000 residential district and outside a 1000 feet radius from other landowners.</td>
<td>$25,000 cash or surety bond for 10 acre/foot lagoon. Each acre/foot above requires an additional $25,000</td>
<td>None</td>
</tr>
<tr>
<td>White Oak Township- Henry County</td>
<td>Yes</td>
<td>500 confined cattle or sheep per 160 acres and/or 2000 per 640 acres; 1500 confined hogs per 160 acres and/or 6000 per 640 acres; 20,000 confined poultry per 160 acres and/or 80,000 per 640 acres</td>
<td>CAFOs with ≥ 4000 poultry; ≥ 250 cattle or sheep; or ≥ 1100 hogs must have 4000 residential district and outside a 1000 feet radius from other landowners.</td>
<td>$25,000 cash or surety bond for 10 acre/foot lagoon. Each acre/foot above requires an additional $25,000</td>
<td>None</td>
</tr>
<tr>
<td>Windsor Township- Henry County</td>
<td>Yes</td>
<td>500 confined cattle or sheep per 160 acres and/or 2000 per 640 acres; 1500 confined hogs per 160 acres and/or 6000 per 640 acres; 20,000 confined poultry per 160 acres and/or 80,000 per 640 acres</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>York Township- Putnam County</td>
<td>Yes</td>
<td>None</td>
<td>Lagoons and feedlots must be 1400-5280 feet from residence, depending on lagoon size.</td>
<td>$25,000 cash or surety bond for 10 acre/foot lagoon. Each acre/foot above requires an additional $25,000</td>
<td>None</td>
</tr>
</tbody>
</table>
Iowa

Iowa state law includes two measures that limited county level legislation affecting animal feeding operations.

- Iowa Code 331.304A, passed in 1998, limits county powers to regulative livestock operations when it is more restrictive than the state laws and regulations which provides in part:

  "A county shall not adopt or enforce county legislation regulating a condition or activity occurring on land used for the production, care, feeding or housing of animals unless the regulation of the production, care, feeding or housing of animals is expressly authorized by state law."

- Iowa Code 459.403, prevents counties on charging fees for construction permits, manure management plans, or other areas relating to animal agriculture.

  “A county shall not assess or collect a fee under this chapter for the regulation of animal agriculture, including but not limited to any fee related to the filing, consideration, or evaluation of an application for a construction permit pursuant to section 459.303 or the filing of a manure management plan pursuant to section 459.312.”

Indiana

Indiana allows counties to create local zoning ordinances that could affect a confined feeding operation. Zoning ordinances restrictions usually include residential and public building setbacks. These certain requirements are more stringent than what the state of Indiana imposes, an area currently not addressed in statewide regulations. There are no statewide resources listing county level zoning restrictions on animal feeding operations.

Oklahoma

We did not identify any county-based restrictions on animal feeding operations that were more restrictive than the Oklahoma state legislation through our contacts at universities and state agencies. Oklahoma contacts indicated local or county powers over zoning of agricultural lands and agricultural activities are very limited in Oklahoma. There is also little incentive in Oklahoma for county limits because state regulations have largely eliminated new swine construction. Poultry operations are affected by phosphorus standards imposed by the Oklahoma Water Resources Board (OWRB). The OWRB standards are state standards, not local or county-level standards.
5.2 Watershed Limits

Highlights and Impacts:

- All four states have extensive listings of streams listed as impaired where agriculture will likely play a significant role in addressing water quality improvements and may incur additional restrictions.
- Oklahoma and Missouri have state designations to protect selected valued water resources.
- Missouri currently has additional restrictions on animal feeding operations from watershed-based limits affecting 26% of the state. These restrictions include:
  - Sensitive watersheds designation affecting 22% of the state land area. These restrictions eliminate Class I operations in outstanding national resource waters and require spill prevention plans of permitted operations in drinking water watersheds.
  - Impaired watersheds must develop a plan through a public process to reduce contaminants entering the impaired water. Cooperation is currently voluntary but there is intent to tie permit conditions to specific watershed requirements in the future. Water impairments that will likely include an agricultural component in the cleanup plan affect 7% of the state.

Missouri currently has:

- 88 permitted concentrated animal feeding operations or 24% of the total located in a watershed that is designated as impaired where agriculture will likely play a role in remediation;
- 39 permitted concentrated animal feeding operations or 11% of the total in designated drinking water watersheds;
- 162 permitted concentrated animal feeding operations or 44% of the total are in restricted watersheds or counties.

Table 5.2-1. Summary of watershed restrictions on animal feeding operations

<table>
<thead>
<tr>
<th>State</th>
<th>Agriculture related 303(d) listed streams and waterbodies?</th>
<th>Special restrictions in drinking water watersheds?</th>
<th>Other specially designated watersheds?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Indiana</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Iowa</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Appendix 5.2: State-by-state summary

Missouri

Source: 10 CSR 20-6.300(2)(D), 10 CSR 20-7.031

Class IA concentrated animal feeding operations (both new and those operations that wish to expand to a Class IA size) are prohibited from the identified watersheds of the Current, Jacks Fork and Eleven Point Rivers. Class IA operations (new or expanding operations) that are in the following critical watersheds must submit a spill prevention plan for department approval.

- Public drinking water lakes (L1 lakes defined in 10 CSR 20-7.031 and identified in Table G).
- Watersheds located upstream away from the dam from all drinking water intake structures on lakes including the watershed of Table Rock Lake.
- Areas in the watershed and within 5 miles upstream of any stream or river drinking water intake structure, other that those intake structures on the Missouri and Mississippi Rivers.
Figure 2. Location, type and size of permitted concentrated animal feeding operations (CAFOs).
Figure 3. Critical watersheds as defined by the Missouri Department of Natural Resources Clean Water Commission.
Figure 4. Watersheds of waters listed on the 2002 303(d) list as being impaired and likely to involve agriculture as a key component of the remediation effort.
Table 5.2-2. Streams listed on the 2002 303(d) list as being impaired and likely to involve agriculture as a key component of the remediation effort.

<table>
<thead>
<tr>
<th>Name</th>
<th>Distance</th>
<th>Pollutant</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big Sugar Creek</td>
<td>32 miles</td>
<td>Nutrients</td>
<td>Livestock production</td>
</tr>
<tr>
<td>Buffalo Creek</td>
<td>15.5 miles</td>
<td>Nutrients</td>
<td>Livestock production</td>
</tr>
<tr>
<td>Cave Spring Branch</td>
<td>0.2 miles</td>
<td>Nutrients</td>
<td>Nonpoint source/Simmons Ind./Livestock production</td>
</tr>
<tr>
<td>Clear Creek</td>
<td>3 miles</td>
<td>Nutrients</td>
<td>Monett waste water treatment plant</td>
</tr>
<tr>
<td>Davis Creek</td>
<td>2 miles</td>
<td>BOD/DO, Nutrients</td>
<td>Odessa SE waste water treatment plant</td>
</tr>
<tr>
<td>E. Brush Creek</td>
<td>1 miles</td>
<td>Nutrients</td>
<td>California N. waste water treatment plant</td>
</tr>
<tr>
<td>Elk River</td>
<td>21.5 miles</td>
<td>Nutrients</td>
<td>Livestock Production</td>
</tr>
<tr>
<td>Fellows Lake</td>
<td>820 acres</td>
<td>Nutrients/Algae</td>
<td>Agriculture and suburban nonpoint source</td>
</tr>
<tr>
<td>Indian Creek</td>
<td>26 miles</td>
<td>Nutrients</td>
<td>Livestock Production</td>
</tr>
<tr>
<td>Jacks Fork River</td>
<td>7 miles</td>
<td>Fecal Coliform</td>
<td>Organic Wastes</td>
</tr>
<tr>
<td>James River</td>
<td>59 miles</td>
<td>Nutrients</td>
<td>Urban Point and nonpoint source</td>
</tr>
<tr>
<td>Little Sac River</td>
<td>27 miles</td>
<td>Fecal Coliform</td>
<td>Springfield NW, point and nonpoint sources</td>
</tr>
<tr>
<td>Little Sugar Creek</td>
<td>11 miles</td>
<td>Nutrients</td>
<td>Livestock production</td>
</tr>
<tr>
<td>Lamar Lake</td>
<td>180 acres</td>
<td>Nutrients/Algae</td>
<td>Agriculture nonpoint source</td>
</tr>
<tr>
<td>Middle Indian Creek</td>
<td>3 miles</td>
<td>Nutrients</td>
<td>Livestock production</td>
</tr>
<tr>
<td>McDaniel Lake</td>
<td>300 acres</td>
<td>Algae</td>
<td>Ag/urban nonpoint source</td>
</tr>
<tr>
<td>Monroe City Route J Lake</td>
<td>94 acres</td>
<td>Atrazine, Cyanazine</td>
<td>Corn and soybean production</td>
</tr>
<tr>
<td>Mussel Fork</td>
<td>33.6 miles</td>
<td>Sediment</td>
<td>Agriculture nonpoint source</td>
</tr>
<tr>
<td>North Indian Creek</td>
<td>5 miles</td>
<td>Nutrients</td>
<td>Livestock production</td>
</tr>
<tr>
<td>Patterson Creek</td>
<td>2 miles</td>
<td>Nutrients</td>
<td>Livestock production</td>
</tr>
<tr>
<td>South Indian Creek</td>
<td>9 miles</td>
<td>Nutrients</td>
<td>Livestock production</td>
</tr>
<tr>
<td>Shaw Branch</td>
<td>2 miles</td>
<td>Sediment</td>
<td>Barite tailings pond</td>
</tr>
<tr>
<td>Shoal Creek</td>
<td>13.5 miles</td>
<td>Fecal Coliform</td>
<td>Unknown agricultural sources</td>
</tr>
<tr>
<td>Spring Fork Lake</td>
<td>178 acres</td>
<td>Nutrients/Algae</td>
<td>Agriculture nonpoint source</td>
</tr>
<tr>
<td>Table Rock Reservoir</td>
<td>43100 acres</td>
<td>Nutrients</td>
<td>Point and nonpoint source</td>
</tr>
<tr>
<td>Vandalia Lake</td>
<td>37 acres</td>
<td>Atrazine</td>
<td>Corn and soybean production</td>
</tr>
<tr>
<td>West Fork Black River</td>
<td>0.2 miles</td>
<td>Nutrients</td>
<td>Doe Run W. Fork Mine</td>
</tr>
</tbody>
</table>
Figure 5. Combined coverage of critical watersheds, agriculture related 303(d) listed streams, and permitted concentrated animal feeding operations.
Table 5.2-3. Location of permitted concentrated animal feeding operations (CAFOs). CAFO numbers and locations are based on data provided by Missouri Department of Natural Resources from the WQIS database on March 3, 2004.

<table>
<thead>
<tr>
<th>Water Resource</th>
<th>Number of Class IA CAFOs</th>
<th>Number of Class IB CAFOs</th>
<th>Number of Class IC CAFOs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total permitted CAFOs</td>
<td>21</td>
<td>31</td>
<td>316</td>
<td>368</td>
</tr>
<tr>
<td>Total in critical watersheds</td>
<td>1</td>
<td>5</td>
<td>54</td>
<td>60</td>
</tr>
<tr>
<td>Outstanding National Resource Waters</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Public Drinking Water Supply Watershed</td>
<td>1</td>
<td>5</td>
<td>33</td>
<td>39</td>
</tr>
<tr>
<td>Table Rock Lake</td>
<td>0</td>
<td>0</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>Agriculture related 303(d) watersheds</td>
<td>2</td>
<td>4</td>
<td>80</td>
<td>88</td>
</tr>
<tr>
<td>Total in counties with local ordinances or zoning rules</td>
<td>3</td>
<td>3</td>
<td>38</td>
<td>44</td>
</tr>
<tr>
<td>Total in critical watersheds and agricultural related 303(d) watersheds</td>
<td>3</td>
<td>9</td>
<td>112</td>
<td>124</td>
</tr>
<tr>
<td>Total in restricted watersheds and counties</td>
<td>6</td>
<td>11</td>
<td>145</td>
<td>162</td>
</tr>
</tbody>
</table>
Iowa

Iowa's Final 2002 Section 303(d) list contains 205 waterbodies and 286 impairments. Iowa 303(d) information is listed at http://www.iowadnr.com/water/tmdlwqa/wqa/303d.html

Indiana

Source: Indiana Register, Volume 27, Number 4, January 1, 2004

A total of 428 impaired waterbodies (Category 5) on the 2002 303(d) list require TMDL development in the state of Indiana. Indiana 303(d) information is listed at http://www.in.gov/idem/water/planbr/wqs/303d.html.

Oklahoma

Source: OAC 785:46-13-5

A total of 436 impaired waterbodies (Category 5) on the 2002 303(d) list require TMDL development in the state of Oklahoma. Oklahoma 303(d) information is listed at http://www.deq.state.ok.us/WQDnew/305b_303d/.

- New point source discharges of any pollutant after June 11, 1989, and increased load of any pollutant from any point source discharge existing as of June 11, 1989, is prohibited in any waterbody or watershed designated Outstanding Resource Water and/or a Scenic River", and in any waterbody located within the watershed of any waterbody designated with the limitation "Scenic River".

No licensed managed feeding operation (LMFO) established after June 10, 1998 which applies for a new or expanding license from the State Department of Agriculture after March 9, 1998 shall be located within three miles of any designated scenic river area or within one mile of a waterbody designated an Outstanding Resource Water.