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Articles

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I. Introduction

US environmental laws have helped to reduce the emission of pollutants into the nation's air and water, but agricultural operations, including livestock facilities, have often enjoyed exemptions from environmental measures that apply to other industries.[1] In recent decades, significant structural changes in agriculture have led to the

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1. *See* J.B. Ruhl, *The Environmental Law of Farms: 30 Years of Making A Mole Hill Out of a Mountain*, 31 Envtl. L. Rep. (Envtl. L. Inst.) 10203 (2001).

concentration of production in large operations, a development often called "agricultural industrialization."[2] Agricultural industrialization has resulted in large animal production facilities, sometimes called animal feeding operations (AFOs),[3] where many animals are raised in confinement. Indeed, since 1960, US consumption of animal products remained steady or increased, but the number of animal operations declined.[4] The swine industry, in particular, has experienced significant change. For example, between 1997 and 2000, the number of small operations (fewer than 250 sows) decreased 42% and their market share fell 12%, while large-scale operations (more than 25,000 sows) increased

2. Charles W. Abdalla, *The Industrialization of Agriculture: Implications for Public Concern and Environmental Consequences of Intensive Livestock Operations*, 10 PENN ST. ENVTL. L. REV. 175, 176 (2002). *See also* John C. Becker, *Promoting Agricultural Development Through Land Use Planning Limits*, 36 REAL. PROP. PROB. & TR. J. 619, 621-627 (2002) (discussing the emergence of industrialized agriculture); Robert A. Hoppe et al., Structural and Financial Characteristics of U.S. Farms: 2001 Family Farm Report at 15 (ERS, Agriculture Information Bulletin No. 768) (2001), http://www.ers.usda.gov/publications/aib768/aib768c.pdf (last visited Jan. 3, 2003); Thomas R. Head, III, *Local Regulation of Animal Feeding Operations: Concerns, Limits, and Options for Southeastern States*, 6 ENVTL. LAW. 503, 510-513 (2000) (considering social and economic "concerns from family farm to factory farm"); Neil D. Hamilton, *Reaping What We Have Sown: Public Policy Consequences of Agricultural Industrialization and the Legal Implications of a Changing Production System*, 45 DRAKE L. REV. 289 (1997).

3. For purposes of this article, the term animal feeding operation or AFO refers to an agricultural facility that raises livestock or poultry in a confined area. The terms AFO and CAFO (confined animal feeding operations exceeding a certain number of animals) are regulatory triggers in the NPDES permit program under the Clean Water Act. This article surveys state regulatory schemes to control *air* emissions from AFOs, and some air pollution control programs do not use NPDES definitions. It focuses on larger-scale AFOs because these operations are most likely to face regulation of air emissions in the future.

4. IOWA STATE UNIVERSITY & UNIVERSITY OF IOWA STUDY GROUP, IOWA CONCENTRATED ANIMAL FEEDING OPERATIONS AIR QUALITY STUDY: FINAL REPORT at 20 (Feb. 2002), http://www.public-health.uiowa.edu/ehsrc/CAFOstudy/CAFO_final2-14.pdf (last visited June 1, 2004) [hereinafter IOWA AIR QUALITY]. Chapter Two, Industry Structure and Trends in Iowa, tallies production statistics since the 1950s for swine, beef, dairy cattle, poultry and eggs for Iowa and swine for the US.

For an overview of structural changes in Minnesota animal production, *see* ENVIRONMENTAL QUALITY BOARD, MINNESOTA PLANNING AGENCY, FINAL ANIMAL AGRICULTURE GENERIC ENVIRONMENTAL IMPACT STATEMENT (2002), http://www.mnplan.state.mn.us/eqb/geis/GEIS-AnimalAgFinal.pdf (last visited June 1, 2004) [hereinafter MINNESOTA GEIS] (providing historical background to conflicts caused by increased animal concentration and the loss of smaller operations).

The National Agricultural Statistics Service compiles annual statistics on animal numbers. The years 2001-2002 show a continuing decline in number of smaller hog operations (1,999 head or fewer) and an increase in larger operations (2000 head or more). *See* National Agricultural Statistics Service, USDA, USDA-NASS AGRICULTURAL STATISTICS 2003, ch. 7, at 25, http://www.usda.gov/nass/pubs/agr03/acro03.htm.

by 11%, with an 8% gain in market share.[5] Large operations, of course, generate large quantities of wastes.[6]

Public attention has focused recently on air emissions from AFOs.[7] Livestock facilities generate air emissions in the form of particulate matter, gases, and vapors.[8] They also produce odors that result from a number of different sources and compounds.[9] The primary sources of air emissions from AFOs are animal confinement buildings or enclosures, manure storage facilities, and land application of wastes.[10] Air emissions, especially odor, vary significantly depending on "location, size and type of . . . operation, production practices, season, temperature, humidity, time of day, and wind speed and direction."[11]

The measurement of air emissions from AFOs has proven difficult, due to the complexity of substances and their sources, as well as varying geographic and production conditions.[12] These emissions affect human and animal health, the natural environment, and community welfare. Though federal laws govern emissions from some large AFOs,[13] and some state laws regulate emissions, scientists have concluded that effective regulatory schemes can be devised only after further research.[14] Three recent major studies—from the National Research Council[15] and the states of Iowa[16] and Minnesota[17]—evaluated air emissions from

5. IOWA AIR QUALITY *supra* note 4, at 21.

6. Smaller farms also raise environmental concerns. *See* J.B. Ruhl, *supra* note 1, at 10207-08; J.B. Ruhl, *Agriculture and the Environment: Three Myths, Three Themes, Three Directions*, 25 ENVIRONS ENV. L. & POL'Y J. 101, 104-05 (2002).

7. An exhaustive list of media and other accounts of public concern about emissions from large-scale animal production is beyond the scope of this article. The authors note that evidence of rural residents' health and welfare complaints has increased in recent years.

8. IOWA AIR QUALITY, *supra* note 4, at 35-40. *See also* PERRY HAGENSTEIN ET AL., NATIONAL RESEARCH COUNCIL, AIR EMISSIONS FROM ANIMAL FEEDING OPERATIONS: CURRENT KNOWLEDGE, FUTURE NEEDS 50-56 (2003) [hereinafter AIR EMISSIONS].

9. MINNESOTA GEIS, *supra* note 4, at 169.

10. IOWA AIR QUALITY, *supra* note 4, at 48-66. *See also* AIR EMISSIONS, *supra* note 8, at 35-41 (outlining prevalent production and manure management systems).

11. REGION 6, US EPA, SWINE CAFO ODORS: GUIDANCE FOR ENVIRONMENTAL IMPACT ASSESSMENT at 2-1, http://www.epa.gov/earth1r6/6en/xp/odor.pdf (last visited Sept. 8, 2003).

12. IOWA AIR QUALITY, *supra* note 4, at 67.

13. These include the Clean Air Act (CAA), 42 U.S.C. §§ 7401-7671(q) (2004); Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, or Superfund Law), 42 U.S.C. §§ 9601-9675 (2004); Emergency Planning and Community Right-to-Know Act (EPCRA), 42 U.S.C. §§ 11001-11050 (2004); and the Federal Water Pollution Control Act (CWA), 33 U.S.C. §§ 1251-1387 (2004).

14. AIR EMISSIONS, *supra* note 8, at 22 (stating that data is limited, and "current information is not sufficient in many cases to support defensible regulations"). *See also* MINNESOTA GEIS, *supra* note 4, at 19-20; IOWA AIR QUALITY, *supra* note 4, at 35.

15. AIR EMISSIONS, *supra* note 8.

16. IOWA AIR QUALITY, *supra* note 4.

AFOs in light of the most recent scientific research, but researchers have yet to develop techniques to measure emissions accurately and effective control technologies to abate harmful emissions.

More intense regulatory focus on emissions from large-scale animal operations began in the early 1990s. Protection of water quality has been of primary concern, with air emissions receiving less regulatory attention.[18] In recent years, however, the Environmental Protection Agency (EPA) and others have initiated lawsuits against AFOs that violate the Clean Air Act (CAA).[19] Increased federal attention to air

17. MINNESOTA GEIS, *supra* note 4.

18. Indeed, until 2002, California's exemption of agricultural sources from regulation under its Clean Air Act (CAA) implementation program had enjoyed EPA approval. The EPA agreed, as part of a 2002 settlement, to withdraw its approval of the part of the California's permit program that had exempted major stationary agricultural sources from permits by state and local authorities. Assoc. of Irritated Residents et al. v. EPA, No. 02-70160, settlement reached (9th Cir. 2002); 67 Fed. Reg. 63551 (2002). Oregon, which has a similar exemption, indicated that none of its exempt agricultural operations are major stationary sources. 67 Fed. Reg. at 63557.

In response, California passed legislation to eliminate the exemption for agricultural sources and to require air districts to establish a CAA emissions control program and to issue permits for agricultural sources. 2003 Cal. Legis. Serv. ch. 479 (S.B. 700), filed Sept. 22, 2003. The California Air Pollution Control Officer Association issued a White Paper in July 2004 to provide guidance for implementing the requirements of S.B. 700, *available at* http://www.capcoa.org/sb_700.htm.

19. The EPA has initiated enforcement action or participated in citizen suits for violations of federal air pollution control laws. In November 2001, the EPA intervened in a citizen suit and settled a case against the nation's second-largest pork producer, Premium Standard Farms, Inc. (PSF) for violations, among others, of the CAA, EPCRA, and CERCLA. Citizens Legal Envtl. Action Network, Inc. v. Premium Standard Farms, Inc., No. 97-6073-SJ-6, settlement reached (W.D. Mo. 1997). As part of the agreement, Premium Standard Farms (PSF) must substantially eliminate ammonia emissions from wastewater treatment systems and irrigated fields and monitor air emissions of particulate matter, volatile organic compounds (VOCs), hydrogen sulfide, and ammonia. *See* Consent Decree, Apps. A and F, *available at* http://www.psfarms.com/consent_decree.html. If monitoring indicates that emissions levels exceed CAA thresholds for any regulated pollutant, despite installation of control technology, PSF must apply for any necessary CAA permits. *Id.* ¶ 16(a). Similar citizen suits have been filed in Kentucky and Oklahoma. *See* Sierra Club v. Tyson Foods, Inc., 299 F. Supp. 2d 693 (W.D. Ky. 2003) (denial, in part, of motion and cross motion for summary judgment); Sierra Club v. Seaboard Farms, Inc., 2002 U.S. Dist. LEXIS 27302, 2002 U.S. Dist. LEXIS 27303 (motion for reconsideration) (W.D. Okla. 2002). Parties in *Seaboard Farms* entered a consent decree, which allowed Sierra Club to appeal the issue of Seaboard's failure to report air emissions under CERCLA § 103(a). The Tenth Circuit, 2004 U.S. App. LEXIS 22455 (10th Cir. 2004), held that the whole farm was a "facility" under CERCLA (so air emissions from the whole farm would be aggregated in applying the reporting threshold) and remanded the case.

In 2003, the US EPA filed a complaint in the Northern District of Ohio seeking injunctive relief and penalties against Buckeye Egg Farms for violations of the Clean Air Act at its giant egg-laying facilities. United States v. Buckeye Egg Farm, L.P. et al, No. 3:03 CV 7681, settlement reached (N.D. Ohio 2003). Based on preliminary air samples that detected significant amounts of particulate matter and ammonia from Buckeye

emissions from AFOs, precipitated in part by structural changes in animal production and public concern, will likely lead to stricter federal regulation.

As a step toward a federal regulatory program, the EPA, later joined by the US Department of Agriculture (USDA), funded a National Research Council (NRC) study of air emissions from AFOs. The EPA expected the study to help identify "appropriate emission factors or alternative approaches for estimating emissions for various animal agricultural operations" so that the agency can make policy decisions necessary to implement a CAA permit program for AFOs.[20] The final NRC report, published in 2003,[21] outlined several findings and recommendations.[22] Moreover, the EPA is currently developing a consent agreement with the livestock industry under which producers would initiate a two-year, nationwide emissions monitoring program in exchange for immunity against enforcement of federal CAA and other laws that govern air emissions.[23]

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facilities, the defendant agreed to spend more than $1.6 million to install, test, and report on innovative pollution controls at three of its facilities. Consent Decree, *available at* http://www.4cleanair.org/members/committee/agriculture/BuckeyeEggSettlement.pdf. *See also* Press Release, U.S. Department of Justice, Ohio's Largest Egg Producer Agrees to Dramatic Air Pollution Reductions From Three Giant Facilities (Feb. 23, 2004), http://www.usdoj.gov/opa/pr/2004/February/04_enrd_105.htm.

20. 67 Fed. Reg. 63551, 63558 (responding to comments about withdrawal of approval of part of California's operating permit program). The EPA continued, "Once the final [NRC] report is released, the Agency intends to carefully evaluate the . . . findings and results, as well as the results of any other relevant research, and develop specific guidance for the implementation of the title V permitting program for animal agriculture." *Id.*

21. AIR EMISSIONS, *supra* note 8.

22. *Id.* at 4-9. The report concluded, for example, that (1) initial efforts should focus on the measurement and control of emissions of major concern; (2) measurement protocols, control strategies, and management techniques must be emission specific and, for air emissions important on a local scale (e.g., hydrogen sulfide, particulate matter and odor), monitoring should be conducted and standards developed to control ambient concentrations at the farm boundary or nearest occupied dwelling; (3) best management practices should continue to be studied and improved; (4) a standardized methodology and unit of odor measurement should be adopted in the US; (5) scientifically sound and practical protocols for measuring air concentrations and emission rates are needed for pollutants such as ammonia, hydrogen sulfide and particulate matter; and (6) scientific methods for estimating air emissions from individual AFOs should be developed to provide an accurate basis for regulations and management programs to mitigate air emissions. *Id.*

23. Other laws include CERCLA and EPCRA. *See* US EPA, Consent Agreement and Final Order, CAA-HQ-2004-XX (Mar. 11, 2004 Draft), http://www.4cleanair.org/members/committee/agriculture/AFOCAFO.pdf [hereinafter Consent Draft]. The Agreement provides that, in exchange for industry monitoring of pollutants including VOCs, hydrogen sulfide, particulate matter and ammonia, the EPA will not sue participants for civil violations of Title I and Title V of the CAA, or other enforceable state implementation program (SIP) requirements for major and minor sources. *Id.* ¶ 24.

State measures, too, can serve as a valuable resource for reducing air emissions from AFOs. Effective state programs may suggest strategies for developing a federal CAA program for AFOs. Of course, state statutes and regulations will continue to implement and supplement federal CAA requirements. This article examines regulatory efforts in seven major livestock-producing states that address, both directly and indirectly, air emissions from AFOs.[24] The conclusion draws from these state programs, to recommend critical elements for effective state emission control programs for AFOs.

II. State Regulatory Schemes

In states with significant animal production, facility management statutes often govern construction and operation of AFOs, primarily to protect water quality.[25] In addition, setbacks are used to avoid or minimize odor nuisances, and other provisions of facility management statutes may help to reduce air emissions. Although regulatory schemes vary greatly from state to state, some generalizations are possible. For example, facility management statutes often require pre-construction submission of design specifications and proof of compliance with setbacks for confinement buildings and waste impoundments, specific qualifications for facility operators, and public notice and comment. Most states also direct the applicant to develop a waste management plan that adheres to best management practices prior to issuance of a permit. Some require plans to address air emissions, particularly odors. Other state statutes, or in some cases the state implementation program (SIP) under the federal CAA, establish emission thresholds and measurement

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As part of emission monitoring, industry participants must examine, among other aspects of the operation, the "specific processes that directly or indirectly" influence emissions, including animal activity, manure management and handling, feeding, and climatic conditions. *See* National Air Emissions Monitoring Study, Overview and Summary (Part of Draft Consent Agreement) (Mar. 11, 2004), *available at* http://www.4cleanair.org/members/committee/agriculture/NationalAirEmissionsStudySummary.pdf. *See* Pat Gallagher & Barclay Rogers, *Down on the Factory Farm*, 20 THE ENVTL. FORUM 30 (2003).

24. Units of local government in some states have sought, often unsuccessfully, to regulate air and odor emissions from AFOs through zoning and public health ordinances. *See, e.g.*, *infra* notes 44, 113, 156-57.

Private nuisance actions may also serve to abate air emissions from AFOs, although right-to-farm laws protect some producers. An analysis of local zoning, nuisance actions, and right-to-farm laws, albeit important considerations in curtailing AFO air pollution, are beyond the scope of this article. This article refers to county zoning only to the extent that it demonstrates what occurs when counties possess little or no control in the AFO permitting process or try to remedy perceived inadequacies in state programs.

25. Some states regulate livestock facilities through NPDES permit programs under the Clean Water Act. These programs have been (or will be) amended to comply with new federal CAFO regulations published at 68 Fed. Reg. 7176 (2003).

mechanisms for certain air pollutants.

Although a few states allow units of local government to participate in the permit process under facility statutes, these units are more likely to assert authority through zoning or public health ordinances. In some states, however, facility management statutes or other laws preempt local government zoning of AFOs.

A. Minnesota

Minnesota, more than many other states, has devoted significant regulatory attention to air emissions from AFOs. Minnesota requires air emission plans for large livestock facilities and applies hydrogen sulfide standards to animal agriculture. Under a state program, governmental units have been asked to cooperate to develop effective odor control strategies. After significant study, Minnesota issued a General Environmental Impact Statement[26] that addresses the impact of animal agriculture on air quality.

Minnesota also requires feedlots and manure storage areas to acquire construction and operating permits under its Feedlot Program.[27] Counties may issue permits, if they have been delegated power to do so, and counties may enact ordinances more stringent than state law.[28] Feedlot Program regulations do not preempt counties, townships, or cities from supplementing state regulations under zoning ordinances.[29]

1. The Feedlot Program

a. Registration and Permits

The Minnesota Pollution Control Agency (MPCA) has primary authority for the control of air pollution generated from AFOs.[30] Feedlots with a capacity of 50 or more animal units (AUs) are required to

26. MINNESOTA GEIS, *supra* note 4.

27. MINN. R. 7020.0200 (2003).

28. MINN. STAT. § 116.07(7)(k) (2004).

29. MINN. R. 7020.0200 (stating that "[t]his chapter does not preempt the adoption or enforcement of zoning ordinances or plans by counties, townships, or cities"). At least 64 counties have enacted ordinances that govern animal facilities. MINN. DEP'T OF AGRIC., SUMMARY OF ANIMAL-RELATED ORDINANCES IN MINNESOTA COUNTIES 13-14 (Feb. 2000), *available at* http://www.mda.state.mn.us/agdev/animalordinancesummary.pdf (data as of Mar. 1999).

30. MINN. STAT. § 116.07. This authority includes power to issue orders or enter into stipulations, require record-keeping, use of monitoring equipment, and testing for odor where a nuisance exists. *Id.* § 116.07(9)(a)-(b). The MPCA is successor to the Water Pollution Control Commission. *Id.* § 116.02(5). The agency maintains a website devoted solely to feedlots, *available at* http://www.pca.state.mn.us/hot/feedlots.html.

register with the MPCA or the "delegated county."[31] In addition, proposed feedlots must register or apply for a permit.[32] Local governments have authority to conduct inventories of feedlots under their jurisdictions.[33]

In Minnesota, AFOs applying for feedlot permits may be required to complete an environmental assessment worksheet (EAW).[34] Feedlots with a capacity of 1,000 AUs (or expansion of 1,000 AUs) require an EAW, as do feedlots and expansions of more than 500 AUs in certain sensitive locations.[35] If the EAW indicates that the feedlot has potential for significant environmental impacts, a full environmental impact statement (EIS) may be required.[36]

In addition to the EAW or EIS, feedlots and other facilities that require permits[37] must provide detailed information about the facility,

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31. MINN. R. 7020.0350(2)(A). An owner of land where livestock have *pastured* is exempt from requirements for feedlot or manure management, as long as the land remains in pasture. MINN. STAT. § 116.07(7d). Information required for registration includes facility location, types of animal holding and manure storage areas, number and types of animals, and distance from surface waters and wells. MINN. R. 7020.0350(1).

32. MINN. R. 7020.0350(4)(A)(1)-(2).

33. MINN. STAT. § 116.07(7b). Public notice of the inventory is required.

34. MINN. R. 4410.1000(1) (2003). "The EAW is a brief document prepared in worksheet format which is designed to rapidly assess the environmental effects which may be associated with a proposed project."

35. *Id.* 4410.4300(29). Other livestock facilities may be included, if the Environmental Quality Board (EQB) determines that the project may have the potential for significant environmental effects. *Id.* 4410.1000(3). *See also* Guidelines for Alternative EAW Form for Animal Feedlots, *available at* http://www.mnplan.state.mn.us/pdf/ 2000/eqb/alt_eawguide.pdf.

36. MINN. R. 4410.1700, 4410.2000. *See* Vasgaard v. Murray County Bd. Comm'rs, 2003 Minn. App. LEXIS 987 (Minn. Ct. App. 2003) (unpublished opinion). Murray County, the government unit responsible for conducting an environmental assessment of the proposed operation, granted a conditional use permit to a livestock facility with plans to expand from 300 to 2,000 hogs. Plaintiffs petitioned the County Board for preparation of an EAW, presenting evidence that air emissions would adversely affect the elderly and those with existing health problems and that surface and ground waters would be contaminated. *Id.* at *14. In denying the petition, the County Board noted that as part of the permit, the owner/operators were required to plant trees to buffer odor emissions and that the owner planned to live at the site. *Id.* at *15. The Board also concluded that because the operation was in an existing agricultural area, some odors could be expected. *Id.* Because the plaintiffs had presented material evidence that chemical and odor emissions would affect neighbors adversely and manure would contaminate water, the court held that the County Board's decision not to require an EAW was unreasonable, arbitrary, and capricious. *Id.* at *21-22.

37. The Minnesota Environmental Rights Act gives each person residing in the state, and political subdivisions within the state, the right to the "protection, preservation, and enhancement" of air and other natural resources and a civil remedy to protect air from "pollution, impairment, or destruction." MINN. STAT. § 116B.01. But no action is allowed for conduct pursuant to an environmental permit issued by MPCA. MINN. STAT. §§ 116B.01, 116B.03. A plaintiff may establish a *prima facie* case by showing that a defendant's conduct likely violates an environmental quality standard, permit, or other

including a manure management plan. AFOs with 1,000 or more animal units and manure storage areas with the capacity for manure produced by 1,000 or more animal units must include an air emissions plan that specifies methods and practices for minimizing air emissions from the feedlot and from start-up, loading, and removal of manure at the waste storage area.[38] The plan also must list measures to mitigate air emissions in the event that the facility exceeds the state hydrogen sulfide standard.[39] Further, the applicant must prepare a complaint response protocol that lists each potential odor source at the facility, the sources most likely to generate significant amounts of odor, and anticipated odor control strategies.[40]

Minnesota imposed a moratorium from 18 May 2002 until 20 June 2007 on approval of permits for new open-air swine basins. For other types of waste management facilities, Minnesota regulations establish site restrictions and requirements for the design, construction, maintenance, and operation of liquid manure storage areas.[41] These provisions, like the required manure management plan, focus primarily on protection of water resources.[42]

b. County Administration of the Feedlot Program

MPCA rules govern the issuance and denial of permits for livestock feedlots and other types of animal lots.[43] Counties may enact ordinances more stringent than required by the MPCA feedlot program.[44] With the

provision. *Id.* § 116B.04. Certain family farms and family farm corporations are exempt from actions under this law. *Id.* § 116B.02(2).

38. MINN. R. 7020.0505(4)(B)(1)(a).

39. *Id.* 7020.0505(4)(B)(1)(b). On the hydrogen sulfide standard, *see infra* text accompanying notes 48-56.

40. *Id.* 7020.0505(4)(B)(1)(c)(i)-(iii). Minnesota law requires notification to nearby residents when a feedlot with a capacity of more than 500 animals applies for a permit. MINN. STAT. § 116.07(7a)(a). *See also* MINN. R. 7020.2000 (providing other notification requirements).

41. MINN. R. 7020.2100.

42. *Id.* 7020.2225(4)(D).

43. MINN. STAT. § 116.07(7)(g). MPCA rules apply to permits issued both by the MPCA and by counties. MINN. R. 7020.

44. MINN. STAT. § 116.07(7)(k). The Minnesota Court of Appeals has held that local ordinances are not preempted by state pollution control laws, including the state feedlot program. *See, e.g.,* Canadian Connection v. New Prairie Township, 581 N.W.2d 391 (Minn. Ct. App. 1998), *review denied*, 1998 Minn. LEXIS 652; Blue Earth County Pork Producers, Inc. v. County of Blue Earth, 558 N.W.2d 25 (Minn. Ct. App. 1997), *review denied*, 1997 Minn. LEXIS 256. *But see* Board of Supervisors of Crooks Township v. ValAdCo, 504 N.W.2d 267, 269 (Minn. Ct. App. 1993), *review denied*, 1993 Minn. LEXIS 675 (township ordinance regulating emissions from feedlots is preempted). For an analysis of a county's ability to zone large operations as commercial, and therefore prohibited from locating near populated areas, in part because of their potential to emit significant air pollution, *see Berscheit v. Town of Gray Eagle*, 1999 Minn. App. LEXIS

approval of the MPCA, any county may become a delegated county and assume responsibility for processing applications for feedlot permits.[45] At the option of the county, processing may also include issuing and revoking permits, subject to review by the MPCA.[46] The delegated county program allows regulation of facilities with fewer than 1,000 animal units, and 55 counties participate.[47]

2. Hydrogen Sulfide Standards

Minnesota regulators have recognized that hydrogen sulfide, ammonia, and particulate matter[48] are emissions of great concern.[49] Therefore, Minnesota has developed a comprehensive air program for animal agriculture, despite difficulties in measuring air emissions from AFOs. Minnesota has an ambient air quality standard for hydrogen sulfide, which applies to emissions from AFOs as well as other sources.[50] The two-part standard imposes a limit of 0.03 ppm (30 ppb) (half hour average), not to be exceeded more than twice in five consecutive days, and a limit of 0.05 ppm (50 ppb), not to be exceeded more than twice per year.[51] The method of measurement, to be approved by the MPCA, must

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795, at *1 (Minn. Ct. App. 1999) (unpublished opinion).

A county board may adopt ordinances to define, prevent, and abate public health nuisances and to regulate "offensive trades"—that is, employment "from which offensive odors arise." MINN. STAT. §§ 145A.05(6) (offensive trades); 145A.05(7) public health nuisances (the Local Public Health Act).

45. MINN. STAT. § 116.07(7); MINN. R. 7020.1500.

46. MINN. STAT. § 116.07(7)(b), (h).

47. Amendments to the feedlot rules adopted in October 2000 expanded the role of these delegated counties. MINN. R. 7020.1600. *See also* Minnesota Pollution Control Agency, Feedlot Program (Feb. 2003), *available at* http://www.pca.state.mn.us/publications/feedlot-overview-0203.pdf.

48. Minnesota has primary and secondary ambient air quality standard for particulate matter (PM_{10} and $PM_{2.5}$). MINN. R. 7009.0080. But statutes limit the power of the MPCA to consider PM standards in issuing permits and to impose control requirements on AFOs based solely on computer models that project compliance with secondary PM standards. MINN. STAT. §§ 116.0715, 116.0716.

49. *See generally* George Johnson, Minnesota Environmental Quality Board, Measuring Air Pollution and Odor at Minnesota Swine Facilities, *available at* http://www.gov.mb.ca/agriculture/livestock/livestockopt/papers/johnson.pdf.

50. A livestock odor section of the Minnesota pollution control law applies the hydrogen sulfide standards to livestock facilities. MINN. STAT. § 116.0713. Livestock facilities are exempt from the hydrogen sulfide standard while manure is removed from barns and lagoons and for seven days afterwards, but a facility with over 300 AUs may use this exemption for only 21 days in a calendar year and must give notice to the MPCA or the county when it uses the exemption. *Id.* § 116.0713(b)-(d). MINN. R. 7020.2002 requires the operator to notify the MPCA or county of the start date and number of days of manure removal. In counties with delegated programs, the county must maintain records of exemption notifications received from operators. MINN. R. 7020.1600(2)(I).

51. MINN. R. 7009.0080 (2003).

be comparable in accuracy to measurement for other pollutants.[52] The hydrogen sulfide emission standard applies at the property boundary of the livestock operation or a location where the general public has access.[53]

To ensure compliance with ambient air quality standards for hydrogen sulfide, the MPCA must use portable monitoring equipment to monitor livestock facilities and respond to citizen complaints.[54] When producers violate the standards, the MPCA must provide technical assistance, ensure compliance, and assess penalties.[55] The MPCA may not require hydrogen sulfide monitoring for livestock systems in which no violation of the standard has occurred.[56]

3. Intergovernmental Cooperation to Combat Air Pollution

The Feedlot and Manure Management Advisory Committee, which includes representatives of livestock producers, manure applicators, scientists, environmental organizations, and government,[57] was formed to "identify needs, goals, and suggest policies for research, monitoring, and regulatory activities regarding feedlot and manure management."[58] Since its formation in 1994, the Committee has advised agencies and provided a forum for discussion of issues, including odor, of feedlot and manure management.[59]

In cooperation with the MPCA and the Feedlot and Manure Management Advisory Committee, and after consulting with producers and others, the commissioner of agriculture must develop and maintain a list of manure management research and monitoring needs and priorities.[60] The commissioner also must coordinate research on manure management and monitoring, making recommendations on funding priorities.[61] The commissioner of the MPCA, in consultation with the commissioner of agriculture and the Feedlot and Manure Management Advisory Committee, must develop voluntary best management practices

52. *Id.* 7009.0060. Measurement must be comparable in "sensitivity, precision, accuracy, response time, and interference levels." *Id.* The measurement technician must submit a quality assurance plan for operational procedures.

53. MINN. STAT. § 116.0713(e).

54. *Id.* § 116.0713(a)(1).

55. *Id.* § 116.0713(a)(2).

56. *Id.* § 116.0713(f).

57. *Id.* § 17.136(b) (2004).

58. *Id.* § 17.136(a).

59. For information on the committee's accomplishments, *see* http://www.mda.state.mn.us/feedlots/default.htm.

60. MINN. STAT. § 17.138(1).

61. *Id.* § 17.138(2).

for the control of odor at feedlots.[62]

4. The Generic Environmental Impact Statement

In 1998, the Minnesota legislature directed the Environmental Quality Board (EQB) to establish a Livestock Industry Environmental Steering Committee, comprised of livestock, environmental, and other stakeholders, to advise the EQB on the scope and content of a Generic Environmental Impact Statement (GEIS) for animal agriculture.[63] The GEIS, to be prepared under the direction of the EQB, was to examine the long-term environmental effects, including effects on air quality, of the livestock industry.[64]

The process leading to the GEIS resulted in a summary of literature related to air quality and odor, as well as a number of technical work papers. The EQB issued the final GEIS in September 2002.[65] As a result of the GEIS process, the EQB made a number of recommendations. Those connected with air quality included recommendations to "prioritize research funding to address the air and water quality impacts of agricultural chemicals, bacteria, pathogens, and antibiotics" and to accelerate work to develop modeling techniques and other methods for addressing odor and air quality issues for locating and managing feedlots.[66] A Citizens Advisory Committee also made policy recommendations included in the GEIS; eleven of these recommendations concerned air quality and odor policy.[67]

62. *Id.* § 17.138(3).

63. 1998 Minn. Laws chap. 366 § 86(1)-(2). The Feedlot and Manure Management Advisory Committee is successor to the Livestock Industry Environmental Steering Committee, which expired at completion of the GEIS.

64. *Id.* § 86(2)(2).

65. MINNESOTA GEIS, *supra* note 4. The GEIS, with its appendices, totals 1164 pages.

66. *Id.* at 6.

67. *Id.* at 19-39 & App. D. at 316-317. The recommendations are increased use, improvement, and field validation of air emission and air dispersion modeling; increased use, improvement, and field validation of models to help establish operational practices, setbacks and odor levels; reform of the odor complaint process; independent third-party evaluation of feedlots with odor complaints to find site-specific remedies; a state-wide emission inventory of air pollutants; development of air quality control technology for livestock; an audit of the hydrogen sulfide program; monitoring of other states' regulatory efforts to fine-tune Minnesota regulations; seeking federal funding for air quality and odor research and feedlot improvements; improved enforcement of the hydrogen sulfide standard; and required air quality evaluation and/or mitigation on new construction or expansion of outside, open liquid manure storage. On the last recommendation, *see supra* text accompanying notes 40-42 (moratorium on open liquid manure storage for swine waste).

B. Iowa

Like Minnesota, Iowa authorized a study of air emissions from AFOs, the comprehensive *Iowa Concentrated Animal Feeding Operations Air Quality Study,* which appeared in February 2002.[68] In response to the findings of the study, in 2002 the Iowa legislature amended its law governing animal agriculture. The amended law, the Animal Agriculture Compliance Act (AACA),[69] directs the Environmental Protection Commission (Commission) to conduct a field study of air emissions from AFOs and to establish an air emissions program based on the study's findings. A regulatory tug-of-war between the executive branch and the legislature, however, has delayed implementation of the program.[70]

The AACA includes both air and water quality provisions that set construction and operational requirements for AFOs, including manure control, issuance of permits, and operational investigations, inspections and testing by the Department of Natural Resources (DNR).[71] Although Iowa counties may not assume full responsibility for the AFO permit program, they have authority to assess air pollution concerns during the permit process.

1. The Air Quality Provisions in AACA

Under the AACA, manure storage structures at qualified confinement feeding operations[72] must employ bacterial action maintained by the use of air and oxygen, as well as aeration equipment.[73] That is, large-scale operations with anaerobic waste structures must install aeration equipment and operate it according to design specifications. Setbacks for AFOs have been revised and placed in one user-friendly table that lists separation distances between confinement buildings and their accompanying waste handling structures and various "separated locations."[74] The law also sets, with certain exceptions, a

68. IOWA AIR QUALITY, *supra* note 4.

69. 2002 Iowa Acts 1137; IOWA CODE §§ 459.101-.605 (2003).

70. *See* text accompanying notes 83-105.

71. IOWA CODE § 459.103. *See* IOWA. ADMIN. CODE r. 561-1.2(11) (2003) (giving DNR a role in abating and preventing water pollution). DNR maintains a website specifically addressing AFOs and air quality. *See* http://www.iowadnr.com/air/afo/afo.html.

72. IOWA CODE § 459.102(38). Qualified confinement feeding operations are defined by size; e.g., 2500 or more animal units in a swine farrowing operation; 5400 or more in a farrow-to-finish operation.

73. *Id.* § 459.206.

74. *Id.* § 459.202; IOWA ADMIN. CODE r. 567-65.11 (2004). Separated locations include a residence not owned by the owner of the AFO, a commercial enterprise,

separation distance of 750 feet between land application of manure and certain separated locations or public use areas.[75]

In addition to operational standards and setbacks, the AACA added a new provision designed to develop broader air quality standards for AFOs, with enforcement authorized after 1 December 2004. Under this provision, the Department must first conduct a comprehensive field study to monitor the level of airborne pollutants (defined as hydrogen sulfide, ammonia, and odor) emitted from AFOs, including each type of confinement structure.[76] After the study is completed, the Department may develop "comprehensive plans and programs for the abatement, control, and prevention of airborne pollutants originating from animal feeding operations. . . ."[77] These may be developed, however, only if the study "demonstrates to a reasonable degree of scientific certainty that airborne pollutants emitted by an animal feeding operation are present at a separated location at levels commonly known to cause a material and verifiable adverse health effect."[78] Thus, depending on its findings, the study may lead to measures to protect air quality and eventually to an enforceable air quality standard.[79] In addition to air quality standards,[80] the Department is to recommend best management practices, mechanisms, processes, or infrastructure to reduce air emissions from AFOs.[81] The Department must also provide a procedure to approve and monitor "alternative or experimental practices, mechanisms, processes, or infrastructure."[82]

In April 2003, the Environmental Protection Commission (Commission) attempted to adopt air quality standards for hydrogen sulfide and ammonia,[83] as recommended in the *Air Quality Study*.[84] The

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religious institution, or educational institution. IOWA CODE § 459.202.

75. IOWA CODE §§ 459.204; 459.205.

76. *Id.* § 459.207(1)(a), (2). For a legislative attempt to repeal this section, *see infra* text accompanying note 93. A two-year study of odor is underway, with specially-trained employees called "nasal rangers." *See* Amy Lorentzen, *Nasal Rangers Sniff Out Odors at Farms*, http://news.findlaw.com (Assoc. Press., Oct. 27, 2003).

77. IOWA CODE § 459.207(3)(a).

78. *Id.* A separated location is a location that requires a separation distance (e.g., a residence, commercial enterprise, religious organization, or educational institution) under §§ 459.202, 459.204. *Id.* § 459.207(1)(b).

79. *Id.* § 459.207(3)(a).

80. Compliance with air quality standards would be based on measurements at separated locations. When a standard is violated, investigation to trace the air pollutant is authorized, and investigators may enter AFO premises. *Id.* § 459.207(3)(b).

81. *Id.* § 459.207(3)(c).

82. *Id.* § 459.207(3)(d). This may be part of the comprehensive plans and programs under (3)(b).

83. 25 Iowa Admin. Bull. 1489 (May 14, 2003). Enforcement was to begin no earlier than 1 December 2004.

84. *See* IOWA AIR QUALITY, *supra* note 4. The ammonia standard was 150 ppb and

Iowa Legislature nullified the new standards before they could take effect.[85]

In January 2004, the Commission proposed rules that would establish a Health Effects Value (HEV) and Health Effects Standard (HES) for airborne levels of hydrogen sulfide from AFOs.[86] The HEV would be "compar[ed] against monitored levels of hydrogen sulfide to determine the quality of air at homes, schools, churches and other public use areas that meet the legislatively defined criteria of 'separated location.'"[87] The Commission proposed a hydrogen sulfide HEV of 15 ppb (0.015 ppm), daily maximum one-hour average, measured at a separated location and not to be exceeded more than 7 times per year.[88] At the property line of the AFO, the HEV would rise to 70 ppb (0.07 ppm).[89]

Also in early 2004, the Iowa legislature circulated House File (H.F.) 2523, which would amend both the CAA and AFO provisions of the Iowa Code to include standards for hydrogen sulfide, ammonia, and odor emissions. H.F. 2523 prohibited the Commission from promulgating an ambient air quality standard not in force under US EPA regulations and from applying any CAA rules to AFOs.[90] The File established an Odor Health Effect Advisory Panel,[91] which would report to the General Assembly about the health effects levels, "if any," for odor and whether a health effect level for odor could be determined with a "reasonable degree of scientific certainty."[92]

In addition, H.F. 2523 struck the "AFO—airborne pollutants control" section entirely,[93] adding a new provision to limit Commission

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the hydrogen sulfide standard 15 ppb, both daily maximum one-hour averages, with technical monitoring requirements specified in the *Iowa Ambient Air Sampling Manual.* The rule did not adopt the *Iowa Air Quality* recommendation for odor. 25 Iowa Admin. Bull. at 1490. Instead, these standards were an amendment to the federal NAAQS, which Iowa adopted. *See* IOWA ADMIN. CODE r. 567-28.1.

85. 80th Gen. Assem., 2003 Session (Iowa 2003), SJR 5.

86. 26 Iowa Admin. Bull. 1175 (Jan. 7, 2004). The HEV, the level that causes "a material and verifiable adverse health effect," would be codified in a new chapter 32 of chapter 567 of the Iowa Administrative Code. The HES would be used to initiate plans and programs to mitigate emissions. *Id.* at 1176. For general information regarding the proposed HEV, *see* Iowa Department of Natural Resources, Air Quality Bureau, Fact Sheet for Hydrogen Sulfide Health Effects Standards, Dec. 2003, *available at* http://www.iowadnr.com/air/afo/files/H2Sfactsheet.pdf [hereinafter Fact Sheet for Hydrogen Sulfide]. The hydrogen sulfide standard would apply only to air emissions from AFOs. *Id.*

87. Fact Sheet for Hydrogen Sulfide, *supra* note 86, at 2.

88. 26 Iowa Admin. Bull. at 1179.

89. *Id.* at 1175.

90. H.F. 2523, 80th Gen. Assem., 2d Sess. (Iowa 2003), §§ 1 & 2.

91. *Id.* § 3.

92. *Id.* § 3(6)(a).

93. *Id.* § 4. The section is IOWA CODE § 459.207.

action until a minimum three-year field study is completed.[94] Upon completion, the Commission would be required to recommend "best management practices, mechanisms, processes, or infrastructure" to reduce airborne pollutants from AFOs.[95] The new section also provided for Commission rules to enforce a human health-based standard ("minimal risk level" or "health effect level") for hydrogen sulfide and ammonia.[96] Odor standards would be allowed in some situations.[97] A minimal risk level or health effect level set by the Commission could not exceed the standards or limitations required by the federal CAA or EPA regulations.[98] The bill set the short-term and long-term minimal risk levels for hydrogen sulfide and ammonia.[99] The hydrogen sulfide risk level proposed by the legislature (e.g., 70 ppb (0.07 ppm) short term) was significantly less-stringent than that proposed by the Commission.

Lastly, H.F. 2523 established a "monitoring advisory committee" to advise the Department on the monitoring of airborne emissions of hydrogen sulfide, ammonia and odor as required by the House File or rules promulgated by the Commission implementing the its provisions.[100] The committee would also evaluate and assess protocols for data collection, processing and retention, as well as instrument calibration and siting for the objective collection of data and selection of monitoring equipment.[101]

Governor Vilsack vetoed H.F. 2523 on 13 April 2004. In his veto statement, Vilsack noted that the Bill was "many times less protective of health than those imposed in surrounding states where livestock production continues to thrive."[102] Vilsack stated at a press conference, however, that he would ask the Department to raise the proposed 15 ppb (0.015 ppm) standard for hydrogen sulfide to 30 ppb (0.03 ppm).[103]

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94. H.F. 2523, *supra* note 90, § 4(2).

95. *Id.* § 4(5)(a).

96. *Id.* § 4(5)(b).

97. *Id.* § 4(5)(b)(1)-(2). Health effect levels for odor from a specific pollutant or from an animal production system would be allowed in restrictive circumstances.

98. *Id.* § 4(7).

99. *Id.* §§ 4(4)(a)(1)-(2), 4(4)(b)(1)-(2). Enforcement could be initiated only on receipt of a complaint from the owner or occupant of a separated location. *Id.* § 4(6). For violations of short-term risk levels for hydrogen sulfide or ammonia, the AFO would have 180 days to take corrective action and would not be subject to enforcement or penalties during that period. AFOs would have one-year to take corrective action for odor violations.

100. *Id.* § 4(8). Members of the committee, appointed by the Governor, could not be representatives of the Department.

101. *Id.*

102. Veto Message, The Iowa Legislature, Gen. Assem. (Apr. 13, 2004), House Journal 1400, *available at* http://www.legis.state.ia.us/GA/80GA/Session.2/Affected/VHF2523.htm.

103. Rod Swoboda, *Vilsack's Veto of Livestock Air Quality Bill Stirs Reaction*,

On 19 July 2004, the Commission issued its HEV rule, subsequently renamed "Animal Feeding Operations Field Study."[104] Influenced by recommendations of the Iowa Department of Public Health and by California's ambient air quality standard for hydrogen sulfide, the Department set the HEV at 30 ppb (0.03 ppm). The HES, which triggers "plans and programs" to abate emissions, is exceeded when the HEV is violated more than seven times per year.[105] These standards will be used in the AFO field study that will measure levels of hydrogen sulfide (as well as ammonia and odor) to determine if material adverse health effects exist.

2. Water Quality Provisions

Some Iowa water quality measures may help reduce air emissions, albeit indirectly. The AACA requires a construction permit for a confinement feeding operation (CFO) with a capacity of at least 1,000 animal units[106] and for an "unformed manure storage structure," regardless of size.[107] The Department cannot approve a construction permit without, among other things, a manure management plan.[108] CFOs of a certain size (e.g., more than 1000 cattle on an open feedlot) must also apply for an operating permit.[109] Regulations require manure control measures,[110] including a manure management plan for certain operations.[111] Operators must therefore follow guidelines for the land application of manure, including application based on nitrogen use and

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WALLACES FARMER, Apr. 2004.

104. 27 Iowa Admin. Bull. 274 (Aug. 18, 2004).

105. IOWA ADMIN. CODE r. 567-32.2 to 32.4 (2004).

106. IOWA CODE § 459.303(1)(a)(1). For purposes of AFO regulation, the statute uses the term "confinement feeding operation," which is defined as "an animal feeding operation in which animals are confined to areas which are totally roofed." *Id.* § 459.102(14).

107. *Id.* § 459.303(1)(a)(2). An unformed manure storage structure is "a covered or uncovered impoundment used to store manure, other than a formed manure storage structure, which includes an anaerobic lagoon, aerobic structure, or earthen manure storage basin." *Id.* § 459.102(50).

108. *Id.* § 459.303(3)(b). The county board of supervisors plays a role, discussed below, under § 459.303(2).

109. IOWA ADMIN. CODE r. 567-65.4.

110. *Id.* r. 567-65.2.

111. *Id.* rr. 567-65.16, 567-65.17. Rule 567-65.17, which sets out the contents of the manure management plan, was amended effective Aug. 25, 2004. 27 Iowa Admin. Bull. 141 (ARC 3517B).

Those who spread manure for a CFO also need a plan. IOWA ADMIN. CODE r. 567-65.16(1)(c). A 2004 news report indicated that as many as 600 producers faced legal action for failure to file plans. Perry Beeman, *State to Crack Down on 600 Hog Producers*, DES MOINES REGISTER (Mar. 4, 2004).

setbacks similar to those imposed by air quality laws.[112]

3. The Master Matrix and County Participation in the Permit Process

In new provisions, the AACA gives counties a significant role in the permit approval process for CFOs.[113] When a permit application is submitted, the host county may solicit comments, conduct hearings, and submit comments to the DNR.[114] The county board may also adopt a "construction evaluation resolution" to be filed with the Department.[115] This empowers the board to recommend approval or denial of a permit. Permit decisions, however, must use all criteria provided by the "master matrix," a regulatory evaluation system.[116] The master matrix evaluates the appropriate location for a CFO, including separation distances required by law, type of structure to be constructed, and environmental and community impacts. The master matrix must produce quantifiable results and be scored easily.[117]

The matrix,[118] an appendix to the Iowa CFO regulations, is based on a numerical scoring system, with points awarded in categories that impact air, water, and the community. Proposed facilities receive points for desirable site characteristics and operation and manure management practices. A proposed facility must earn a score of 440, including at least 53.38 for air, 67.75 for water, and 101.13 for community impacts.[119] A proposed CFO receives points for submitting air quality modeling results[120] that demonstrate "annoyance levels" less than 2% of the time for residences located within twice the minimum separation distance. The matrix also awards points for other characteristics of the proposed

112. IOWA ADMIN. CODE r. 567-65.3.

113. IOWA CODE §§ 459.304, 459.305. Although a discussion of county zoning authority is beyond the scope of this paper, Iowa counties are severely limited in regulating CFOs through zoning. *See id.* § 331.304A(2); Kuehl v. Cass Co., 555 N.W.2d 686 (Iowa 1996); Goodell v. Humboldt Co., 575 N.W.2d 486 (Iowa 1998).

114. IOWA CODE § 459.304(2)(a)(2), (b).

115. IOWA ADMIN. CODE r. 567-65.10(3).

116. IOWA CODE § 459.304(3)(b). For the master matrix, *see id.* § 459.305. The board may consider public comment, but the master matrix must be evaluated as well.

117. *Id.* § 459.305(1)(b).

118. 25 Iowa Admin. Bull. 1145 (Feb. 19, 2003), codified at IOWA ADMIN. CODE r. 567-65, App. C. A simpler interim matrix was published previously at 25 Iowa Admin. Bull. 283 (Aug. 21, 2002).

119. IOWA ADMIN. CODE r. 567-65, App. C. There is no perfect score, but many more than 440 points could be earned, if optimum siting and operational practices are followed.

120. The analysis must use the University of Minnesota OFFSET model. LARRY JACOBSON, DAVID SCHMIDT, & SUSAN WOOD, UNIVERSITY OF MINNESOTA EXTENSION SERVICE, OFFSET, ODOR FROM FEEDLOTS SETBACK ESTIMATION TOOL (2002), *available at* http://www.extension.umn.edu/distribution/livestocksystems/DI7680.html.

facility that may reduce air emissions, such as installation of filters on exhaust fans, installation of bio-filters or other impermeable cover on waste management facilities, and landscaping. Additional points are added for appropriate manure management and application (e.g., sale, composting, burning, injection).

The county board must score all criteria in the master matrix, but may base its recommendation on the matrix or on other comments.[121] The Department must approve a facility that receives a positive county recommendation and complies with state law.[122] If the county board recommends that an application be disapproved, based on a rating produced by the matrix, the Department must determine whether the application meets the requirements of the AACA.[123] If so, the Department must reevaluate the application using the master matrix and must approve it if the facility receives a satisfactory score.[124] Thus, the county board plays a significant role, but cannot veto a facility that meets legal requirements and receives a satisfactory matrix score. The county, however, may contest the Department's decision by requesting a hearing before the Commission, and judicial review is available.[125]

C. Missouri

Missouri odor regulations set odor emission limitations and require large AFOs to submit odor control plans. In addition, Missouri's CAA permit-by-rule program includes detailed operational requirements for AFOs to prevent air pollution. Although Missouri's CAA specifically contains a hydrogen sulfide emission standard, it does not refer to AFOs specifically. Provisions that govern water quality permits include setbacks, waste handling plans, and operator certification, but do not involve counties in the permitting process. Moreover, courts have held that counties may not impose additional requirements on AFOs through zoning. At least one court, however, has allowed county regulation of AFOs under a public health ordinance.

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121. IOWA CODE § 459.304(3)(b), (c). The Department must receive the county's evaluation within 30 days of the delivery of the application to the Department. *Id.* § 459.304(4).

122. *Id.* § 459.304(5)(a).

123. *Id.* § 459.304(5)(b).

124. *Id.*

125. *Id.* § 459.304(8)(b)(2) & (8)(c). An applicant may request a hearing before the Commission or an administrative law judge. *Id.* § 459.304(8)(b)(1).

1. Clean Air Act Laws and Regulations

a. Odor Control Plans and Limits on Odor Emissions

The Missouri Air Conservation Commission (Commission)[126] has authority to enact regulations to ensure state compliance with requirements of the CAA. The Commission has promulgated regulations addressing odor emissions from Class IA confined animal feeding operations.[127] Class IA facilities, those with a capacity of 7,000 or more animal units, must develop, implement, and submit for approval a plan that describes their odor control measures.[128] The plan should include a list of all "innovative and proven" odor control options, which may include "prevention, odor capture and treatment, odor dispersion, add-on control devices, modifications to feed-stock or waste-handling practices, or process changes."[129] The plan must discuss feasible odor control options, rank feasible options, and evaluate the most effective options. In light of these considerations, the plan must then describe the options to be implemented at the CAFO, the schedule for implementation, and a monitoring plan.[130]

The odor regulation also limits odor emissions. Both screening evaluations and further measurements may be required. The first measurement, which serves as a screening evaluation, must be taken at a site "not at the installation."[131] A Class IA facility may not cause, permit or allow odors to be emitted that can be perceived after dilution with 5.4 volumes of odor-free air.[132] If odor is detected after dilution, further

126. MO. REV. STAT. § 643.040 (2004).

127. MO. CODE REGS. ANN. tit. 10, §§ 10-2.070(4), 10-3.090(5), 10-4070(4), 10-5.160(3) (2004). Missouri issues air quality standards separately for each of the state's four air quality areas: the Kansas City metropolitan area, outstate area, Springfield-Greene County, and the St. Louis metropolitan area. The discussion of the CAFO standards refers to the outstate area.

Class I facilities are designated by statute. Class IA facilities have a capacity of 7,000 animal units (AUs) or more; IB, 3,000 to 6,999 AUs; IC, 1,000 to 2,999 AUs. Class II facilities have a capacity between 300 and 999 AUs. MO. REV. STAT. § 640.703(3)-(6).

128. MO. CODE REGS. ANN. tit. 10, § 10-3.090(5)(A). New Class A1 CAFOs must have approval of the odor control plan prior to construction. *Id.* § 10-3.090(5)(B).

129. *Id.* § 10-3.090(5)(A)(1)(A).

130. *Id.* § 10-3.090(5)(A)(1)(A)-(G). The Commission, after consultation with the Water Pollution Control Program, must approve or disapprove the plan within 60 days of finding the plan complete. *Id.* § 10-3.090(5)(A)(2).

131. *Id.* § 10.3.090(5)(C)(1).

132. The regulation prohibits odorous matter "[i]n concentrations and frequencies or for durations that the odor can be perceived when one (1) volume of odorous air is diluted with five and four-tenths (5.4) volumes of odor-free air for two (2) separate trials not less than fifteen (15) minutes apart within the period of one (1) hour." *Id.*

testing by olfactometry is required.[133] The Commission may require ambient air quality monitoring, field data collection, and analysis for a Class IA facility that exceeds odor thresholds after implementation of its odor control plan.[134]

b. Hydrogen Sulfide Standards

Missouri has set air quality standards for hydrogen sulfide under its implementation of the CAA.[135] The more lenient standard, not to be exceeded more than twice per year, is 0.05 ppm (50 ppb) (70 micrograms per cubic meter, half-hour average). A stricter standard, 0.03 ppm (30 ppb) (42 micrograms per cubic meter, half-hour average), may not be exceeded more than twice in five consecutive days. The hydrogen sulfide provisions do not refer specifically to emissions from AFOs or other agricultural operations, nor do they exempt AFOs.

c. Clean Air Act Permits by Rule

Missouri CAA regulations allow construction permits by rule. This provision applies to CAFOs and associated manure storage and application systems constructed after 30 November 2003.[136] Livestock operations, including AFOs and CAFOs, constructed prior to that date are exempt from construction permits,[137] unless modification results in increased animal capacity.[138] The permit-by-rule program prescribes specific operational practices intended to control air pollution.[139]

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133. *Id.* Measurement by scentometer or similar technique is required. Violations are defined by these standards: "concentrations with a best estimation threshold, represented as $Z_{OL} \geq 110$, as determined using American Society for Testing and Materials Standard E 679-91 . . . at an olfactometer flow rate of twenty (20) liters per minute" or "at intensities greater than that of two hundred twenty-five (225) parts per million of n-butanol odorant in air, which serves as a reference scale, as determined by an olfactory panel evaluation of a sample of the odorous air." *Id.* § 10-3.090(5)(C)(2).

134. *Id.* § 10-3.090(5)(D). The regulation refers to violation of the standards listed in the prior footnote. Monitoring is limited to eight quarters unless subsequent violations of the odor emission standard occur. *Id.*

135. *Id.* § 10-6.010. The rule provides "long-range goals for ambient air quality . . . to protect the public health and welfare." *Id.*

136. *Id.* § 10-6.062(3)(B)(4) (applicable in all areas of Missouri).

137. *Id.* § 10-6.060 (enumerating basic requirements).

138. *Id.* § 10-6.061(3)(A)(2)(D).

139. Required practices for cleanliness and ventilation of buildings include thorough cleaning between groups of animals, weekly (or more frequent) scraping of manure and spilled feed, regular cleaning of ventilation systems, and adjustment of ceiling air inlets for adequate airflow. *Id.* § 10-6.062(3)(B)(4)(A)(I)-(V). For "deep bedded structures," animal bedding and/or litter must be kept reasonably clean; that is, the operator must avoid extensive caking of manure, the coating of manure on animals or birds, and the inability to distinguish bedding from manure. *Id.* § 10-6.062(3)(B)(4)(A)(VII). High-rise structures require engineered ventilation, with regular maintenance and cleaning. *Id.*

Agricultural groups challenged the permit-by-rule provision, as well as the odor and hydrogen sulfide standards noted above. The Missouri CAA states that air quality standards and guidelines should not be stricter, or enforced sooner, than those required under the federal CAA.[140] No federal CAA standards apply to odors or hydrogen sulfide, nor are permits required under federal law for facilities that do not emit threshold quantities of pollutants. Plaintiffs argued, therefore, that the Missouri rules at issue go beyond federal requirements and, accordingly, are enforced sooner than federal rules.[141] The court concluded that the Missouri CAA provision makes federal law preemptive and prohibits standards stricter than federal, but where no federal law exists, the Commission has authority to enact standards for Missouri. The odor, hydrogen sulfide, and permit-by-rule regulations are therefore proper under Missouri law.[142]

2. Clean Water Act Permits: Setbacks, Notification, and Certification

The Hog Bill,[143] passed as an emergency measure, authorized the Department of Natural Resources (Department) to regulate the "establishment, permitting, design, construction, operation and management" of Class I animal feeding operations.[144] A permit is

§ 10-6.062(3)(B)(4)(A)(VI). If a facility has an automatic feeding system, tubes that deliver the food must extend into the feeder to prevent dust generation. *Id.* § 10-6.062(3)(B)(4)(A)(VIII).

Manure storage practices under the permit by rule require regularly-scheduled maintenance to prevent build-up of manure. *Id.* § 10-6.062(3)(B)(4)(B). Buildings with flush alleys, scrapers, or manure belts must be operated to remove manure at least daily; shallow pits of four feet or less must be emptied at least every 14 days. *Id.* § 10-6.062(3)(B)(4)(B)(I)-(II). Lagoons must be monitored for the build-up of solids at least once every five years, and manure compost piles must be maintained at a temperature between 105 and 150 degrees F. *Id.* § 10-6.062(3)(B)(4)(B)(IV)-(V). No feed, other than that spilled by the animals, can be disposed of in waste management systems. *Id.* § 10-6.062(3)(B)(4)(B)(III). Dead animals must be removed from buildings daily and cannot be deposited in waste management systems unless the system was designed for composting. *Id.* § 10-6.062(3)(B)(4)(D). Further, when applying wastes to land, the operator must consider the wind direction and velocity, and manure must not be applied within 500 feet of a downwind inhabited residence. *Id.* § 10-6.062(3)(B)(4)(C).

140. MO. REV. STAT. § 643.055(1).

141. Friends of Agric. v. Zimmerman, 51 S.W.3d 64, 77-78, 80 (Mo. Ct. App. 2001).

142. *See id.* at 78-82. The court affirmed the circuit court's partial summary judgment on these issues.

143. 1996 Mo. Laws H.B. 1207. *See* Jerome M. Organ & Kristin M. Perry, *Controlling Externalities Associated With Concentrated Animal Feeding Operations: Evaluating the Impact of H.B. 1207 and the Continuing Viability of Zoning and the Common Law Nuisance,* 3 MO. ENVTL. L. & POL'Y REV. 183, 186 (1996).

144. MO. REV. STAT. §§ 640.710.1, 640.755 (2004). On the classes of facilities, *see supra* note 127. *See also* MO. CODE REGS. Ann. tit 10, § 20-6.300(1)(B)(3) (defining

required for a CAFO that includes facilities for "generation, storage, treatment, use or disposal of process wastes" if the CAFO is a Class I operation, a Class II operation with discharge through a "manmade conveyance," or any other designated operation.[145] An operation with capacity for fewer than 300 AUs that uses approved best management practices is exempt.[146]

To protect neighboring land, Class I operations must be designed with a statutory distance between the nearest animal containment building or lagoon and any occupied residence or public building.[147] Buffer distances (setbacks) increase with the size of the facility.[148] Prior to application for a construction permit for any Class I facility, the owner or operator must notify the Department, the county, and all adjoining landowners located within one and one-half times the prescribed setback distance.[149] Notice must include the location of the facility, a waste handling plan and general layout, the animal capacity, and the fact that the Department will accept written comments for thirty days.[150] All operations must submit a map showing the operation layout, buffer distances, and property owners within one and one-half times the buffer distance.[151]

Missouri Clean Water Commission regulations also include a chapter on operation of CAFO waste management systems. Under these regulations, certified personnel must operate all Class IA wet or dry

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AUs).

A number of provisions apply only to Class IA facilities that use a flush system, that is, "a system of moving or removing manure utilizing liquid as the primary agent as opposed to a primarily mechanical or automatic device." MO. REV. STAT. §§ 640.700, 640.703(9).

145. MO. CODE REGS. ANN. tit. 10, § 20-6.300(2)(A)(1)-(3).

146. *Id.* § 20-6.300(2)(B)(2). In May 2004, budget reductions led to discontinuation of a voluntary Letters of Approval plan for AFOs smaller than 1000 AUs. *See id.* § 20-6.300(6). Missouri DNR, News Release No. 138, *available at* http://dnr.missouri/gov/newsrel/ nr04_138.htm (May 21, 2004).

147. MO. REV. STAT. § 640.710.2(1)-(3); MO. CODE REGS. Ann. tit 10, § 20-6.300(5)(A)(1). The Department may authorize a shorter setback distance, but that recommendation may be rejected by the county. MO REV. STAT. § 640.710.4.

148. MO. CODE REGS. ANN. tit 10, § 20-6.300(5)(A)(1)(A)-(C) (1000 feet (Class IC), 2000 feet (Class IB), and 3000 feet (Class IA)).

Setbacks do not apply if owners of a residence within the setback distance agree in writing to a waiver. *Id.* § 20-6.300(5)(A)(4). When the Department allows the shorter setback, the written agreement must be recorded and becomes part of the chain of title of the owner who agrees to waive the setback. *Id.* Facilities constructed prior to 25 June 1996 and in continuous operation without expansion thereafter are exempt from setback requirements. *Id.* § 20-6.300(5)(A)(2)(A)-(C). If the operation expands, only the expansion is subject to the setback. *Id.* § 20-6.300(5)(A)(3).

149. *See* MO. REV. STAT. § 640.710.2(1)-(3) (establishing setbacks between the nearest confinement building or lagoon and any occupied residence or public building).

150. *Id.* § 640.715.1; MO. CODE REGS. ANN. tit. 10, § 20-6.300(5)(B)(1)-(2).

151. *Id.* § 20-6.300(5)(B)(4).

handling waste management systems.[152] Certification requires completion of waste management system training, with at least thirty hours on wet handling and eighteen hours on dry handling, a certification exam, and documented experience. Class A operators must have four years of experience while Class B operators are required to have only one.[153] The certificate must be renewed every three years after proof of approved renewal training.[154]

3. County Authority to Impose Heath-Related Requirements

One Missouri county has been successful in its attempt to regulate air and odor emissions from AFOs to protect public health. The Missouri Supreme Court has held that a township may not impose, as a county zoning requirement, setback requirements for "livestock sewage lagoons" and hog finishing buildings.[155] The Missouri Court of Appeals has held, however, that a county may require permits, which include setbacks and other operational requirements, when the stated purpose of the regulation is to ameliorate health problems associated with livestock facilities, and that such regulations are not preempted by state law.[156] Although the court recognized that the regulations in question (setbacks from water supplies and buildings, regulation of structures and lagoons) had a "zoning quality about them," the defendants convinced the court that significant health hazards are associated with hog facilities and that the regulations were "rationally related to the purpose of public health enhancement and disease prevention."[157]

D. Texas

In Texas, a consolidated program governs water and air quality general permits. Like Missouri, the "air standard permit" portion of the

152. *Id.* §§ 20-14.010(2)(C), 20-14.020(2)(A).

153. *Id.* § 20-14.020(3)(G)(2).

154. *Id.* § 20-14.020(4)(A)-(B). Reciprocity exists with states whose certification standards are at least as stringent as Missouri's, and certification can be suspended or revoked for cause. *Id.* § 20-14.020(5)-(6).

155. Premium Standard Farms v. Lincoln Township, 946 S.W.2d 234, 235 (Mo. 1997).

156. Borron v. Farrenkopf, 5 S.W.3d 618, 622-624 (Mo. Ct. App. 1999). For a discussion of *Borron*, *see* William C. Ellis, Casenote, *Pig in a Poke: Missouri Draws Tenuous Line Between Public Health and Zoning Ordinances in Allowing County Regulation of Concentrated Animal Feeding Operations*, 8 MO. ENVTL. L. & POL'Y REV. 29 (2001).

One could ask whether a county health standard would be preempted by state health-based regulations for AFOs, for example like Iowa's HEV, discussed *supra* text accompanying note 105.

157. *Borron*, 5 S.W. 3d at 622.

consolidated program imposes specific operational requirements to control the emission of odors and other air contaminants from AFOs. Texas does not maintain a specific air emission threshold for odors, and its hydrogen sulfide limitation does not mention AFOs specifically. Local governments in Texas play an important role in monitoring air pollutants and administering air quality programs.

1. The TCAA Permit-by-Rule Program

Although facilities that emit air pollutants in Texas normally must obtain individual permits under the Texas CAA (TCAA),[158] the TCAA authorizes the Texas Commission on Environmental Quality (TCEQ) to use a permit by rule for categories of facilities that do not "significantly contribute air contaminants to the atmosphere."[159] Though certain facilities defined as "major" under the federal CAA do not qualify for this program[160] AFOs are among facilities for which the permit-by-rule program may apply.

A facility qualifies for the permit-by-rule program only if it meets both general and specific requirements set out in TCEQ regulations. As a general requirement, no facility permitted by rule may emit more than 250 tons per year (tpy) of carbon monoxide or nitrogen oxides, 25 tpy of volatile organic compounds, sulfur dioxide, or particulate matter (PM_{10}), or 25 tpy of "any other air contaminant."[161] AFOs may be permitted by rule if they confine no more than a maximum number of animals.[162] An AFO may obtain an air standard permit under the Subchapter B rules (the consolidated air and water quality program, discussed below) if the facility meets the requirements of the TCAA permit-by-rule program, as well as the other requirements of Subchapter B.

2. The Consolidated Air and Water Quality Permit Program

The Texas Subchapter B rules govern the consolidated air and water

158. TEX. HEALTH & SAFETY CODE ANN. ch. 382 (Vernon 2004), with regulations at 30 TEX. ADMIN. CODE ch. 116 (West 2002).

159. TEX. HEALTH & SAFETY CODE ANN. § 382.051(b)(4); *see also id.* § 382.05196.

160. *Id.* § 382.05196.

161. 30 TEX. ADMIN. CODE § 106.4(a)(1) (West 2002). Emissions of carbon dioxide, water, nitrogen, methane, ethane, hydrogen, and oxygen are not considered. Other general provisions of § 106.4 focus on federal permit requirements.

162. *Id.* § 106.161(1). *E.g.*, 1,000 cattle, 2,500 swine weighing no more than 55 pounds, or 1,000 animal equivalents. The regulations also sets standards for caged poultry operations. *Id.* § 106.161(6), (8). On-site feed handling and milling portions of an AFO are covered, if no products are shipped off-site. *Id.* § 106.161(9). Livestock auction facilities can be permitted by rule, if environmental conditions are met. *Id.* § 106.162.

quality general permit program for AFOs.[163] A permit-by-rule program for AFOs first was enacted by regulations effective in 1995.[164] When a Texas court declared those regulations invalid,[165] earlier regulations, effective in 1987, were amended to include the permit-by-rule program.[166] These early Subchapter B rules consolidated air and water quality permit procedures and requirements for CAFOs. In July 2004, Texas significantly amended Subchapter B to comply with new federal CAFO regulations and to improve air and water quality conditions in Texas.[167] Subchapter B limits discharge into waters of Texas and also requires facilities to "prevent the creation of a nuisance or a condition of air pollution" under Texas law.[168] Livestock facilities subject to Subchapter B therefore must comply with requirements for both air and water quality and will receive both permit authorizations.

a. Eligibility

The Subchapter B consolidated program, effective 15 July 2004, adopts federal regulatory definitions for AFOs and CAFOs[169] and focuses primarily on water quality permits under the Texas Pollution Discharge Elimination System.[170] One provision of Subchapter B governs air emissions specifically.[171] Under that provision, all AFOs, regardless of size, must obtain air quality authorization.[172]

AFOs may obtain air quality authorization under the consolidated permit program in one of three ways: meet permit-by-rule requirements of Chapter 106 (the TCAA permit-by-rule regulations for AFOs);[173] obtain an individual permit under Chapter 116 of the TCAA; or meet the requirements of Subchapter B and the general conditions for TCAA and

163. 30 TEX. ADMIN. CODE §§ 321.31-.47 (effective July 15, 2004).

164. *Id.* §§ 321.181-.198 (Subchapter K) (now ineffective).

165. The Subchapter K rules had applied the permit by rule to new CAFOs, beginning in 1995. 20 Tex. Reg. 4719 (1995); 30 TEX. ADMIN. CODE §§ 321.181-.198. An appellate court invalidated those regulations because the Texas Natural Resource Conservation Commission (predecessor of the TCEQ) had failed to provide a reasoned justification for their adoption. Texas Natural Res. Cons. Comm'n v. Accord Agric., Inc., 1999 Tex. App. LEXIS 6898 (Tex. App. 1999).

166. 30 TEX. ADMIN. CODE §§ 321.31-.49 (amended in part and repealed in part at 29 Tex. Reg. 6652 (2004)). These early rules were amended in part to comply with federal NPDES requirements, 24 Tex. Reg. 5721 (1999).

167. 29 Tex. Reg. 6652-6722 (2004).

168. 30 TEX. ADMIN. CODE § 321.31(b), which refers to TEXAS HEALTH & SAFETY CODE ANN. chs. 341 and 382.

169. 30 TEX. ADMIN. CODE §§ 321.32(3), (13).

170. *Id.* §§ 321.34-.42, .44. This article does not focus on these detailed water quality provisions.

171. *Id.* § 321.43.

172. *Id.* § 321.43(a).

173. *See supra* text accompanying notes 159-63.

the "air standard permit" contained in administrative regulation.[174] A CAFO or AFO that obtains a water quality authorization and satisfies the air quality requirements of Subchapter B will qualify for an air standard permit instead of an individual air quality permit.[175] The air standard permit requirements of the Subchapter B rules, and the general conditions for air standard permits, apply to all components of the AFO, including permanent odor sources, land management units, and associated operations.[176]

The operator of an AFO may obtain an air standard permit along with an individual or general water quality permit. Alternatively, the operator may submit a separate written request for an AFO air standard permit, indicating that the AFO will comply with all requirements in Subchapter B for air standard permits. Registration for authorization to operate under the air standard permit is not required.[177] While a fee is charged for the water quality authorization, there is no fee for the air standard permit for AFOs.[178]

A CAFO or AFO is ineligible for air quality authorization under the air standard permit if it does not have water quality authorization, is a new major source, or is located at a site that constitutes a major source as defined by regulations implementing the TCAA.[179] AFOs that are not defined as CAFOs, but maintain a "control facility to manage manure, litter or wastewater," are authorized to operate under general conditions separate from the water and air quality authorization requirements.[180]

b. Requirements for the Air Standard Permit

As part of the air standard permit, AFOs must operate to prevent nuisances and identify and abate nuisances that do occur.[181] Operators

174. 30 TEX. ADMIN. CODE § 321.43(a)(1)-(3). *See also id.* § 116.615 (general conditions for air standard permits).

175. *Id.* § 321.43(d).

176. *Id.* § 321.43(b).

177. *Id.* § 321.43(e).

178. *Id.* § 321.43(f).

179. *Id.* § 321.43(g); 30 TEX. ADMIN. CODE ch. 116 (TCAA implementing regulations).

180. 30 TEX. ADMIN. CODE § 321.47(b)(1). Among other requirements, which mainly relate to the control of water pollution, the AFO must "prevent nuisance conditions and minimize odor conditions." *Id.* § 321.47(c)(2); *see also id.* § 321.31(b).

181. *Id.* § 321.43(j)(1)(A), (B). A nuisance is

> [a]ny discharge of air contaminant(s) including, but not limited to, odors of sufficient concentration and duration that are or may tend to be injurious to or that adversely affects human health or welfare, animal life, vegetation or property, or which interferes with the normal use and enjoyment of animal life, vegetation, or property.

Id. § 321.32(32).

may not create a "condition of air pollution."[182] AFOs must comply with buffer distances, ranging from one-quarter to one-half mile, depending on when the AFO began operation.[183] AFOs in operation on or before 19 August 1998 either may choose a one-quarter mile buffer or implement an odor control plan; operations that started later may use a half-mile buffer or a quarter-mile buffer plus an odor control plan.[184] The odor control plan must be developed and implemented to control and reduce odors, dust and other air contaminants; it must identify structural and management practices and, if necessary, additional measures to abate odors.[185]

To minimize odors, AFOs that produce process-generated wastewater must design and operate retention control structures in accordance with accepted engineering practices.[186] The rule outlines accepted design standards for anaerobic and aerobic treatment lagoons, but allows alternative, equivalent technology or design standards that minimize odors.[187] Owners must control dust using specified practices, including control of fugitive emissions from grain receiving pits, in-plant roads, external conveying systems associated with a feed mill, and feed milling.[188] If control practices are not successful, the operator may be ordered to take additional abatement measures.[189]

Maintenance and housekeeping practices must prevent nuisance conditions, such as odors and dust.[190] For example, spilled raw materials or waste products must be picked up and disposed of every day;[191] pens must be drained, and uncompacted manure must be scraped from earthen pens.[192]

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182. *Id.* § 321.43(j)(1)(A). The TCAA defines a condition of air pollution as

> the presence in the atmosphere of one or more air contaminants in such concentration and or such duration that:
>
> (A) are or may tend to be injurious to or to adversely affect human health or welfare, animal life, vegetation, or property; or
>
> (B) interfere with the normal use or enjoyment of animal life, vegetation, or property.

TEX. HEALTH & SAFETY CODE ANN. § 382.003(3). An air contaminant is "particulate matter, radioactive material, dust, fumes, gas, mist smoke, vapor, or odor or any combination thereof produced by processes other than natural. Water vapor is not an air contaminant." 30 TEX. ADMIN. CODE § 321.32(2).

183. 30 TEX. ADMIN. CODE § 321.43(j)(2). Buffer distances may be waived by the owner of land within the required distance, *id.* § 321.43(j)(2)(D).

184. *Id.* § 321.43(j)(2).

185. *Id.* § 321.43(j)(2)(F).

186. *Id.* § 321.43(j)(3).

187. *Id.* § 321.43(j)(3)(B)(i)-(iii).

188. *Id.* § 321.43(j)(4)(A)-(D).

189. *Id.* § 321.43(j)(4)(E).

190. *Id.* § 321.43(j)(5).

191. *Id.* § 321.43(j)(5)(A).

192. *Id.* § 321.43(j)(5)(B).

c. Other Requirements

In conjunction with a permit or authorization under Subchapter B, an AFO is required to prepare a pollution prevention plan (PPP).[193] Although the PPP and the related site evaluation, record-keeping, and reporting requirements[194] relate mainly to the prevention of water pollution, these requirements may reduce air emissions indirectly. Subchapter B rules indicate that permits or authorizations will establish requirements for training of employees responsible for compliance with the Subchapter B program, but the rules do not specify what training is required.[195]

3. Hydrogen Sulfide Standards

Texas has enacted an emission standard for hydrogen sulfide. The TCEQ rules, part of the TCAA rules, distinguish between types of receiving property. Emissions of hydrogen sulfide that affect a downwind property used for residential, business or commercial purposes may not exceed a net ground level concentration of 0.08 ppm (80 ppb) averaged over a 30-minute period.[196] The emission limit is 0.12 ppm (120 ppb) for other property, including industrial property or vacant tracts and range land not normally occupied by people.[197] A rule describes appropriate calculation methods.[198] Like Missouri's rule, these standards make no specific reference to, or exceptions for, animal agriculture. The permit-by-rule standards for CAFOs do not specifically require compliance with emission limitations for hydrogen sulfide to obtain an individual permit or CAFO registration. A Texas newspaper reported that the TCEQ conducted a one-time monitoring of several CAFOs for hydrogen sulfide; although emissions did not exceed the Texas standard, they would have violated the more stringent Minnesota standard.[199]

4. Local Government Authority under the TCAA

Local governments may enter public or private property to determine whether air contaminant levels set by the TCEQ or a municipality are met and whether the landowner is complying with CAA

193. *Id.* § 321.46.
194. *Id.* § 321.46(d), (e).
195. *Id.* § 321.45(a).
196. *Id.* § 112.31.
197. *Id.* § 112.32.
198. *Id.* § 112.33.
199. Steven H. Lee, *Hog Farms Find Home in Texas, But Some Neighbors Raise Health Concerns*, DALLAS MORNING NEWS, Oct. 3, 1999, at 1A.

and TCEQ rules and orders.[200] Local governments are obligated to submit inspection results to the TCEQ upon request.[201] The TCAA also allows local governments to present recommendations to the TCEQ regarding its rules, determinations, variances, and orders that affect areas within their jurisdiction. The TCEQ must "give maximum consideration" to local government recommendations.[202] Localities may also enter into cooperative agreements with the TCEQ or other local governments to conduct air quality management, inspections and enforcement functions, and to provide technical and educational assistance.[203]

E. Illinois

Illinois has implemented a facility statute that relies in part on setback distances to control odor emissions. The design, construction, and operational standards for waste-handling facilities required by the law may also help to reduce air emissions. The Illinois Environmental Protection Act generally prohibits emissions that cause air pollution or violate state regulations or standards. Like Missouri, Illinois has established an "objectionable odor nuisance" standard and has enforced the limitation against AFOs.

1. The Livestock Management Facilities Act

The Livestock Management Facilities Act (LMFA)[204] was enacted, in part, to address odor complaints and other impacts of intensive livestock production.[205] It governs the location, construction, and operation of livestock management and waste handling facilities in Illinois.[206] The Department of Agriculture (Department) has primary

200. TEX. HEALTH & SAFETY CODE ANN. § 382.111(a)(1)-(2).
201. *Id.* § 382.111(b).
202. *Id.* § 382.112.
203. *Id.* § 382.115(1).
204. 510 ILL. COMP. STAT. ANN. 77/1-999 (West 2004).
205. *Id.* 77/5. The LFMA requires the Department of Agriculture to request appropriations to fund environmental research, with priority for, among other things, "odor reduction and control through chemical, biological, or mechanical means," and environmental quality that affects nearby residents, as well as the health of owners, operators, employees, and residents. *Id.* 77/40.
206. In April 2004, Illinois issued a new general permit for CAFOs, which may affect 3,200 facilities. Waste management plans required for the permit may be based on federal CAFO rules *or* requirements under the Livestock Management Facilities Act. In any event, livestock waste application must observe odor control methods (e.g., soil injection or incorporation, consideration of wind direction distance to neighboring residences) to avoid causing air pollution. Illinois EPA, NPDES Permit No. ILA01, General NPDES Permit for Concentrated Animal Feeding Operations, effective May 1, 2004, Special Condition 4.

responsibility for implementing the Act and its regulations;[207] in addition, Illinois Pollution Control Board (PCB) regulations establish standards for waste lagoons.[208]

Setbacks are an important component of odor management under the LMFA. Setback distances for new livestock management and waste handling facilities are determined by the capacity of the facility in animal units (AUs).[209] For example, a facility serving 7,000 or more AUs must be set back at least a mile from a populated area and at least one-half mile from an occupied residence.[210] To ensure compliance with setbacks, information about location must be provided in applications to register earthen livestock waste lagoons[211] and at informational meetings required for new facilities.[212]

Owners or operators must file documents with the Department before construction of a livestock or waste handling facility.[213] If the facility serves 1000 or more AUs or plans to use a lagoon, public notice and an opportunity for an informational meeting are required.[214] Testimony at the meeting includes whether the facility is compatible with setback requirements and whether "odor control plans are reasonable and incorporate reasonable or innovative odor reduction technologies."[215] The county board may submit an advisory recommendation regarding the facility's construction,[216] but the Department makes the final determination, subject to judicial review.[217]

Regulations promulgated by the Illinois PCB set out design and

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207. Department of Agriculture regulations are at ILL. ADMIN. CODE tit. 8, pt. 900 (2004).

208. PCB regulations on livestock waste are at ILL. ADMIN CODE tit. 35, pt. 506 (2004), and EPA regulations on reporting releases of livestock waste are at *id.* pt. 580.

209. 510 ILL. COMP. STAT. ANN. 77/11. To establish a base date for the setback, a prospective operator files a notice of intent to construct a livestock management facility or waste handling facility with the Department. *Id.*

A facility with a capacity of fewer than 50 AUs is excepted from setbacks under LMFA. Older facilities are grandfathered, and setbacks in prior law apply. *See also* ILL. ADMIN. CODE tit. 35, § 501.402, which refers to "maximum feasible location" for certain facilities.

210. 510 ILL. COMP. STAT. ANN. 77/35.

211. *Id.* 77/15(b).

212. *Id.* 77/12(d).

213. *Id.* 77/11.

214. *Id.* 77/12. The informational meeting is governed by ILL. ADMIN. CODE tit. 8, §§ 900.401-.409.

215. *Id.* § 900.405(h)(2), (3), & (6).

216. *Id.* § 900.406.

217. *Id.* § 900.407. Although a discussion of county zoning authority is beyond the scope of this article, it should be noted that Illinois law severely restricts zoning of agricultural facilities. *See* 55 ILL. COMP. STAT. ANN. 5/5-12001, 12201; County of Knox v. The Highlands, LLC, 723 N.E.2d 256, 262-265 (Ill. 1999).

construction standards for lagoons and other waste handling facilities.[218] PCB and LFMA regulations govern odor control. PCB regulations on agriculture-related emissions, enacted prior to the LFMA, focus on odor in a statement of policy, but do not equate odor with air pollution.[219] Operational rules establish setbacks (superseded, for new facilities, by LMFA provisions) and require use of adequate odor control methods and technology to avoid causing air pollution.[220] Operators must practice odor control during removal of manure from storage and subsequent field applications. Recommended practices include soil injection or other methods of incorporation, consideration of climatic conditions (e.g., wind direction), and other practices recommended by agricultural engineers.[221]

Regulations under the LMFA require operators to practice odor control methods during manure removal and field application, following the PCB rules just described.[222] Above-ground waste management facilities must use scientifically-based and economically-feasible odor control methods, which may include bio-covers or synthetic covers.[223] To help control odors, lagoon content must be kept at the minimum design level, with the waste supply to the lagoon located below the minimum design volume, and new lagoons must be charged with water prior to addition of waste.[224] Penalties for violation of these odor control standards include notice, a fine or, for the third offense, a shut-down

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218. 510 ILL. COMP. STAT. ANN. 77/55(c); ILL. ADMIN. CODE tit. 35, pts. 501 (General Provisions), 506 (Livestock Waste Regulations). These regulations work with ILL. ADMIN. CODE tit.8, pt. 900.

219. ILL. ADMIN. CODE tit.35, § 501.102(d) (last amended in 1991):

> It is hereby determined that the construction, establishment and operation of livestock management facilities and livestock waste-handling facilities without environmental planning and safeguards or the use of livestock wastes for agricultural purposes causes, threatens or allows air pollution. . . . It is recognized that the presence of odor is an inherent characteristic of livestock management facilities and livestock waste-handling facilities, and that the detection of such odor does not per se constitute air pollution.

220. *Id.* § 501.402.

221. *Id.* § 501.405.

222. ILL. ADMIN. CODE tit. 8, §§ 900.510, 900.609. *See id.* tit. 35, § 501.405(b). Odor control is required and penalties are authorized by the LFMA, 510 ILL. COMP. STAT. ANN. 77/25.

The LFMA requires a livestock management facility to employ a certified livestock manager. For facilities between 300 and 1,000 animal units, the manager may become certified by attending a course or by passing a competency exam, and for facilities with more than 1,000 animal units, by attending a course and passing a competency exam. ILL. ADMIN. CODE tit. 8, § 900.901(f).

223. ILL. ADMIN. CODE tit. 8, § 900.510(b).

224. *Id.* § 900.609(b), (c). Initial water charge must be at least 60% of minimum design volume. These requirements apply to lagoons built or modified after 1 June 1998.

order.[225]

A similar requirement for odor control, with similar penalties for noncompliance, is part of the regulatory scheme that governs waste management plans.[226] Operators of waste management facilities serving more than 1,000 AUs must prepare a waste management plan, but methods of controlling odor are not listed among the required contents of the plan.[227] Two elements of the plan are odor related: the plan must specify waste applications methods and require that waste applied within a quarter mile of any residence not part of the facility be injected or incorporated on the day of application.[228]

2. Clean Air Provisions in the Illinois Environmental Protection Act

Illinois also addresses odor under generally applicable law and regulations, most significantly the Illinois Environmental Protection Act (IEPA). The IEPA prohibits the emission of any contaminant that causes air pollution or violates Illinois PCB regulations or standards.[229] Air pollution is the presence of "contaminants" (defined to include "any odor") that cause injuries to health, life, or property, as well as unreasonable interference with enjoyment of life or property.[230] The Illinois EPA investigates alleged violations of the law and regulations, including odor complaints. When the EPA and alleged violator cannot reach agreement, a hearing before the PCB may follow.[231] In determining whether a violation has occurred (that is, whether injury occurred or an interference was unreasonable)[232] and what penalty is appropriate, the PCB must take into account all facts and circumstances, including the character of the injury, social and economic value of the pollution source, suitability of the activity to the surrounding area and priority of land use, technical and economic feasibility of reducing or eliminating emissions, and any subsequent compliance.[233]

PCB regulations under the IEPA include air quality standards. Under the odor provisions, PCB regulations establish a procedure for an

225. *Id.* §§ 900.510(c), 900.609(d).
226. *Id.* § 900.816.
227. *See id.* § 900.803.
228. *Id.* § 900.803(k), (o).
229. 415 ILL. COMP. STAT. ANN. 5/9(a).
230. *Id.* 5/3.115. Contaminant is defined in *id.* 5/3.165.
231. *Id.* 5/30-31, 5/32. *See, e.g.*, Processing & Books, Inc. v. PCB, 351 N.E.2d 865 (Ill. 1976).
232. *See* Incinerator, Inc. v. PCB, 319 N.E.2d 794 (Ill. 1974).
233. 415 ILL. COMP. STAT. ANN. 5/33. For application of these factors, *see* Gott v. M'Orr Pork, Inc., 1998 Ill. ENV LEXIS 152 (1998).

"objectionable odor nuisance determination."[234] An objectionable odor nuisance exists, for example, when odor is detectable in ambient air on or adjacent to residential, recreational, institutional, retail, hotel or educational premises after dilution with eight volumes of odor-free air. An odor nuisance exists on or adjacent to industrial premises, when odor is detectable after dilution with twenty-four volumes of odor-free air; and on or adjacent to other premises, after dilution with sixteen volumes.[235] Measurements must be at or beyond the property line or at or near places where people live and work; multiple measurements must be made using a scentometer.[236] The PCB has enforced these standards on several occasions.[237]

F. Colorado

Colorado water quality regulations help to control air emissions through provisions that govern the construction and operation of facilities that treat animal wastes.[238] More significant than water quality provisions, however, is Part B of Regulation 2, which establishes an odor emissions standard for swine feeding operations and requires that anaerobic waste impoundments be covered.[239] By statute, agencies are prohibited from setting air emissions standards for AFOs other than housed commercial swine feeding operations, unless required by federal law, and from regulating odors from livestock feeding operations other than commercial swine feeding operations.[240]

Part A of Regulation 2 applies to sources of odor other than housed commercial swine operations.[241] For residential and commercial areas, odors that can be detected after dilution with seven or more volumes of

234. ILL. ADMIN. CODE tit. 35, § 245.121.

235. *Id.* § 245.121(a)-(c).

236. *Id.* § 245.121(d)-(e). Under the Illinois Criminal Code, "noxious exhalations [and] offensive smells" can constitute a nuisance. 720 ILL. COMP. STAT. ANN. 5/47-5(8).

237. *See* Gott v. M'Orr Pork, Inc., 1998 Ill. ENV LEXIS 152 (1998) (applying the factors enumerated in 415 ILL. COMP. STAT. ANN. 5/33); People v. The Highlands, LLC, 2003 Ill. ENV LEXIS 528 (2003); People v. Henco Hogs, LLC, Consent Order, Civil No. 99 CH 8, Cir. Ct., Henderson County, May 6, 2002, *available at* http://www.epa.state.il.us. *See* Raymond T. Reott, *Novel settlement: a new trend?*, 21(1) AGRIC. L. UPDATE 1 (Dec. 2003).

238. COLO. REV. STAT. §§ 25-8-101 to -702 (2004), 5 COLO. CODE REGS. § 1002-81 (2004) (Regulation 81) (requiring best management practices (BMPs), but no permit, to control pollution from animal waste); COLO. REV. STAT. § 25-8-501.1, 5 COLO. CODE REGS. § 1002-61.13 (pt 13 of Regulation 61) (requiring a water quality permit for housed commercial swine operations).

239. 5 COLO. CODE REGS. § 1001-4, pt. B (2002), promulgated pursuant to COLO. REV. STAT. § 25-7-138.

240. COLO. REV. STAT. §§ 25-7-109(2)(d), 25-7-109(8). For example, emissions from "major stationary sources" must be regulated as required by federal law.

241. Part A was enacted pursuant to COLO. REV. STAT. § 25-7-109(2)(d).

odor-free air violate the regulation; for other areas, the dilution ratio is fifteen. But for agricultural operations, no violation occurs if the operator uses the "best practical treatment, maintenance, and control currently available."[242]

Part B of Regulation 2 was authorized by a section of the Water Quality Control statute that resulted from a ballot initiative adopted in the November 1998 general election. It addresses emission of odors from housed commercial swine feeding operations and operates in conjunction with Part 13 of Regulation 61.[243] Part B, however, does not apply to existing operations that house fewer than 800,000 pounds of live animal weight.[244] Any person adversely affected by a housed commercial swine operation may enforce the statute by bringing suit.[245]

Part B minimizes odor by requiring technology designed to "capture, recover, incinerate or otherwise manage odorous gases."[246] That is, covers are required on new and existing anaerobic waste impoundments.[247] The cover must form a continuous physical barrier, and odors must be vented to treatment equipment, rather than to the atmosphere.[248] Approved covers include rigid covers such as geodesic domes, synthetic covers that float on the surface of the impoundment, or any other approved cover.[249] Owners and operators of aerobic waste impoundments must employ technology to "minimize the emission of odorous gases to the greatest extent practicable."[250]

Part B also lists minimum odor control requirements.[251] For example, swine confinement structures must provide adequate ventilation and use specified dust management practices.[252] Manure in housing structures must be managed appropriately, and solid waste and wastewater collection, treatment, and storage facilities must be loaded and managed correctly.[253] Wastes must be applied to land only between

242. 5 COLO. CODE REGS. § 1001-4, pt. A.I.

243. *Id.* § 1001-4, pt. B.I. Part 13 of Regulation 61 requires a discharge permit from the Water Quality Control Commission.

244. *Id.* § 1001-4, pt. B.II.E. Operations must have existed on 3 November 1998 and must contract to produce for an affiliated agricultural cooperative.

245. COLO. REV. STAT. § 25-7-138(5).

246. 5 COLO. CODE REGS. § 1001-4, pt. B.IV.A.1.

247. COLO. REV. STAT. § 25-7-138(1)-(4); 5 COLO. CODE REGS. § 1001-4, pt. B.IV.A.1-2. For new facilities, the cover requirement becomes part of the permit. *Id.* § 1001-4, pt. B.IV.A.1.

248. 5 COLO. CODE REGS. § 1001-4, pt. B.IV.A.3.a.

249. *Id.* § 1001-4, pt. B.IV.A.3.b(1)-(3). Some covers (e.g., bio-covers) are experimental.

250. *Id.* § 1001-4, pt. B.IV.B.1.-2.

251. *Id.* § 1001-4, pt. B.IX.A.

252. *Id.* § 1001-4, pt. B.IX.A.1.a.-c. *See* part B.IX.B. for technical requirements.

253. *Id.* § 1001-4, pt. B.IX.A.2.-3.

1 March and 31 October, but not on saturated or frozen ground or on weekends and holidays.[254] Operators must dispose of dead animals by incineration, burial, composting, or transportation off site, in a way that minimizes odors.[255] Operators must also monitor periodically, keep detailed records of testing and analysis, and make required reports.[256]

Part B also sets an odor emission limit for housed commercial swine feeding operations. It directs operators to manage odor emissions "from all aspects of the operations" so that odors cannot be detected at the property boundary after the odorous air has been diluted with seven or more volumes of odor-free air.[257] At an "off-site receptor," defined to include occupied primary dwellings, schools, businesses, and municipalities, odor emissions must not be detected after odorous air is diluted with two or more volumes of odor-free air.[258]

Setbacks also play an important role in minimizing odor problems. Under Part B, new waste impoundments and land application areas must be at least one mile from occupied dwellings, schools, businesses, and municipalities;[259] this setback becomes part of the operating permit issued to the facility.[260] In a permit application, an operator must submit an odor management plan[261] with a description and map of the site and its structures, lagoons, and land application areas; construction, design and operation plans; and testing, sampling, and analysis requirements for odors.[262] The public receives notice of filed permit applications, with an opportunity for comment and, on demand, a hearing.[263] After a permit is granted, an operator who intends to modify the operation of the facility in a way that will affect generation of odorous gases must seek approval from the Division for Air Quality.[264] Modifications that require approval include an increased number of animals or changed waste management practices.[265]

An environmental leadership program creates regulatory and other

254. *Id.* § 1001-4, pt. B.IX.A.4. Technical requirements for application equipment are specified in part B.IX.A.4.e.-g.

255. *Id.* § 1001-4, pt. B.IX.A.5.

256. *Id.* § 1001-4, pt. B.X.B.-D.

257. *Id.* § 1001-4, pt. B.III.A.1.

258. *Id.* § 1001-4, pt. B.III.B.1. Receptors can waive this protection.

259. *Id.* § 1001-4, pt. B.V.A.1.-3. Setbacks can be waived by those who benefit (e.g., owner of a dwelling).

260. *Id.* § 1001-4, pt. B.V.B.1.

261. *Id.* § 1001-4, pt. B.VI.D.1.

262. *Id.* § 1001-4, pt. B.VII.

263. *Id.* § 1001-4, pt. B.VI.E.

264. *Id.* § 1001-4, pt. B.VIII.A.

265. *Id.* § 1001-4, pt. B.VIII.A.1.-2. Other changes that require approval are changing the nature and volume of animal wastes and disposal at new locations. *Id.* § 1001-4, pt. B.VIII.A.3.-4.

incentives[266] for operators who, over a three year period, commit no serious violations of regulations and who operate under an environmental management program.[267] The environmental management program includes participation in the National Pork Producers Council's Compliance Audit Program and employee training in animal waste management and odor control.[268] Participants must also demonstrate a willingness to carry out innovative projects that provide significant environmental benefits, mentor other facility operators, and conduct community outreach.[269]

G. North Carolina

Like Colorado, North Carolina[270] has focused its regulatory efforts on odor emissions from swine operation, though North Carolina does not require control technology (e.g., covers) unless best management practices fail. All AFOs must use management practices that control odors, and some swine operations must submit odor management plans. Swine facilities must comply with siting requirements, and a moratorium limits construction of anaerobic lagoons. Waste management systems serving other types of animals, in addition to swine, must be permitted and operated by a certified operator. AFOs must also submit a best management plan. North Carolina does not have air emission standards for hydrogen sulfide, ammonia, or odor.

1. Animal Waste Management System Permits

An animal waste management system[271] in North Carolina must be constructed and operated under an individual or general permit. Permit applications must include an animal waste management system plan

266. *See id.* § 1001-4, pt. B.XI.B.8.a.-e. Incentives include formal public recognition by the governor, opportunity for self-monitoring, consolidation, and simplification of reporting and monitoring, credit for permit fees, and reduced civil penalties in accordance with the EPA and National Pork Producers Council's comprehensive Clean Water Act Compliance Audit Program. *Id.*

267. *Id.* § 1001-4, pt. B.XI.B & B.3.

268. *Id.* § 1001-4, pt. B.XI.B.3.c.-d. For information on the NPPC CWA Compliance Audit Program, *see* http://www.epa.gov/compliance/incentives/programs/porkprodcip.html.

269. 5 COLO. CODE REGS. § 1001-4, pt. B.XI.B.6.a.-c.

270. In North Carolina, the Environmental Management Commission (Commission), a division of the Department of Environment and Natural Resources (Department), has responsibility for control and abatement of air emissions from AFOs. N.C. GEN. STAT. §§ 143-211, 143B-282 (2003).

271. *Id.* § 143-215.10C. "Animal waste management system" is defined as "a combination of structures and nonstructural practices serving a feedlot that provide for the collection, treatment, storage, or land application of animal waste." *Id.* § 143-215.10B(3).

approved by a technical specialist.[272] Among other requirements, the plan must provide "a checklist of potential odor sources and a choice of site-specific, cost-effective remedial best management practices" to minimize odors.[273] Each animal facility must have an annual operations review conduced by a technical specialist.[274] Odors and other air emissions evidently are not the main focus of the operations review; five types of violations, all involving discharges that affect water quality (rather than air emissions), must be reported immediately to the owner/operator and the Commission.[275] The operator of an animal waste management system must hold a valid certificate as an "operator in charge," and others who assist in the operation must work under direct supervision of a certified operator in charge.[276]

2. NPDES Permits

Feedlots in North Carolina, which are classified pursuant to federal regulations, may be required to obtain NPDES permits.[277] If, after on-site inspection, the Department determines that discharges to surface waters may occur, the owner must apply for an NPDES permit, unless the owner can demonstrate that discharges can be eliminated permanently through minor changes to the facility.[278]

A permit-by-rule program[279] applies to animal waste management systems that do not discharge to surface waters. Animal waste

272. *Id.* § 143-215.10C(d). The Commission must encourage the development of alternative and innovative animal waste management technologies and provide regulatory flexibility to allow for timely evaluation and implementation of these technologies. *Id.* § 143-215.10C(g).

273. *Id.* § 143-215.10C(e)(1). The plan must also include provisions for disposal of "mortalities." *Id.* § 143-215.10C(e)(3).

274. *Id.* §§ 143-215.10D(b), 143-215.10F. The technical specialist must be employed by a conservation agency specified by statute and must not have a financial interest in the operation. *Id.* § 143-215.10D(b), (c).

275. *Id.* § 143-215.10E(a)(1)-(5). The Department must report each year to the Environmental Review Commission, among other things, the number of permits granted; operation reviews, re-inspections and compliance inspections conducted; and the number of violations, the status of enforcement actions taken and pending, and the penalties imposed. *Id.* § 143-215.10M.

276. *Id.* § 90A-47.2(a). Requirements for certified operators depend on the type of waste management system. N.C. ADMIN. CODE tit. 15A, r. 8F.0301 (2004).

277. On effluent limitations and permits, *see* N.C. GEN. STAT. §§ 143-215, 143-215.1. NC regulations incorporate the federal CAFO regulations, with any subsequent changes. N.C. ADMIN. CODE tit. 15A, r. 2H.0122.

278. N.C. ADMIN. CODE tit. 15A, r. 2H.0123(a)-(b). Minor changes are those that can be accomplished within 60 days of the Department's notice to the owner that a permit application is required.

279. *Id.* r. 6F.0101, r. 2H.0217 (permit-by-rule requirements). Alternatively, NPDES nondischarge permit requirements may be satisfied by obtaining an individual permit pursuant to r. 2H.0200. *See id.*, r. 6F.0101.

management systems that serve fewer than 100 cattle, 250 swine, 1,000 sheep, or 30,000 birds with a liquid waste system, are permitted by rule and therefore not required to have an approved waste management plan.[280] Larger operations may be permitted by rule, but are required to develop an animal waste management plan.[281] A technical specialist[282] must certify that the best management practices in the plan meet minimum specifications.[283] The plan must be approved prior to stocking of animals.[284] Although plan requirements emphasize protection of water, implementation of the plan could indirectly result in prevention and control of air emissions. The permit-by-rule regulation specifically states that the permit-by-rule program does not allow violations of air quality standards.[285]

3. Control of Odors from Liquid Waste Management Systems

North Carolina has established a special air pollution rule[286] to control objectionable odors beyond the boundaries of large animal operations, e.g., those with 250 or more swine or 100 or more confined cattle.[287] The rule, which applies to all animal operations with liquid waste management systems, requires five specific management practices. In addition, existing swine operations must submit an odor management plan to the Director of the Division of Environmental Management.

a. Odor Management for Facilities with Liquid Waste Management

Animal operations subject to the rule must control odors by implementing prescribed management practices. Dead animals must be disposed of according to methods approved by the State Veterinarian within twenty-four hours after the owner becomes aware of the animal's death.[288] Spray irrigation of wastes must prevent drift beyond the boundary of the operation; in an emergency, waste can be applied to

280. *Id.* r. 2H.0217(a)(1)(A).
281. *Id.* r. 2H.0217(a)(1), r. 6F.0103(a)(1) (certification requirements).
282. Requirements to qualify as technical specialist are at *id.* r. 6F.0105.
283. *Id.* r. 6F.0103(b)-(c). Approved BMPs are discussed at *id.* r. 6F.0104 and r. 2H.0217(a)(1)(H)(i).
284. *Id.* r. 2H.0217(a)(1)(H)(vii).
285. *Id.* r. 2H.0217(f).
286. North Carolina has a general rule addressing control of odors. *See id.* tit. 15, r. 2D.1806. Special rules address odors from animal operations with liquid waste management systems. *See id.* r. 2D.1802-.1804.
287. *Id.* r. 2D.1802. Animal operations are defined with reference to N.C. GEN. STAT. § 143-215.10B(1), which provides size thresholds.
288. *Id.* tit 15A, r. 2D.1802(c)(1).

maintain lagoon freeboard, after notifying of the Department.[289] Intakes for the spray system must be located near the liquid surface of the lagoon.[290] In addition, ventilation fans must be maintained according to manufacturer's specifications,[291] and animal feed storage containers located outside of confinement buildings must be covered except when feed is added or removed.[292]

b. Swine Odor Management Plans

Certain swine operations are required to submit an odor management plan, depending on the live weight of swine in the facility and its distance from the boundary of the nearest occupied property.[293] Plans must be submitted for swine facilities with 10,000 to 20,000 hundredweight that are 3,000 feet or less from occupied properties, with 20,001 to 40,000 hundredweight that are 4,000 feet or less from occupied properties, and with more than 40,000 hundredweight that are 5,000 feet or less from occupied properties.[294] Swine facilities between 1,000 and 10,000 hundredweight may be required to submit a plan if the Director determines that the facility may cause or contribute to objectionable odors.[295] The odor management plan must "describe how odors are currently being controlled and how these odors will be controlled in the future."[296] Odor control measures must apply to animal houses, lagoons, application fields and other sources of odor.[297]

The regulations define an "objectionable odor" as one that may harm or injure human health or interfere unreasonably with enjoyment of life or property. Odors are harmful to human health if "they tend to lessen human food and water intake, interfere with sleep, upset appetite, produce irritation of the upper respiratory tract, or cause symptoms of nausea, or if their chemical or physical nature is, or may be, detrimental or dangerous to human health."[298] Factors used to determine whether an objectionable odor exists are "the nature, intensity, frequency,

289. *Id.* r. 2D.1802(c)(2).
290. *Id.* r. 2D.1802(c)(3).
291. *Id.* r. 2D.1802(c)(4).
292. *Id.* r. 2D.1802(c)(5).
293. N.C. ADMIN. CODE tit 15A, r. 2D.1802(d). An occupied property is an inhabitable structure, business, school, hospital, church, outdoor recreation facility, national and state park, historic property, or child care center. Distance is measured from the barn or lagoon, whichever is closer. *Id.*
294. *Id.*
295. *Id.*
296. *Id.* The plan must contain information required for best management plans for odors, including location information in relation to receiving property. *Id.* r. 2D.1803(a).
297. *Id.* r. 2D.1803(a).
298. *Id.* r. 2D.1801(9).

pervasiveness, and duration of the odors from the animal operation"; complaints received about the objectionable odor;[299] the emission of odor-causing compounds such as ammonia, volatile organic compounds, or hydrogen sulfide; epidemiological studies or other documented health problems from odors from the animal operation; and any other evidence, including records maintained by neighbors, that show the operation causes or contributes to an objectionable odor.[300]

For existing animal operations, an objectionable odor determination is made at the affected property if the animal operation is less than 1500 feet from any occupied residence not owned by the owner of the animal operation, less than 2500 feet from any other occupied property, or less than 500 feet from any property boundary.[301] For new or existing facilities that meet setback requirements, the objectionable odor determination is made "beyond the boundary of the animal operation."[302]

4. Best Management Plans and Control Technology Permits

All new animal operations other than swine must submit a best management plan before beginning construction.[303] Swine facilities have additional obligations, which will be discussed below. If an existing facility fails to submit an odor management plan or the Director finds that an existing animal operation is causing or contributing to an objectionable odor, the Director may require the operation to submit a best management plan to control odors.[304]

Within ninety days of receipt of a notice, the owner must submit a best management plan;[305] after approval, the operation has thirty days to comply with the plan.[306] If the plan is not successful, a revised plan must be submitted.[307] An owner who cannot control odors from the facility[308] may be required to apply for a permit to install control technology to control odors.[309] The owner must identify control technology that is technologically feasible and results in the greatest reduction of odors

299. The rule provides a procedure for the evaluating complaints. *Id.* tit 15A, r.2D.1802(f)(1)-(5). The Director must investigate complaints to the extent practicable and as expeditiously as possible and must respond, in writing, within 30 days.

300. *Id.* r .2D.1802(g).

301. *Id.* r. 2D.1802(e)(1)(A)-(C).

302. *Id.* r. 2D.1802(e)(2).

303. *Id.* r. 2D.1802(l)(2).

304. *Id.* r. 2D.1802(d), (h).

305. *Id.* r. 2D.1802(h)(1).

306. *Id.* r. 2D.1802(h)(2). The Director must ensure that the plan is implemented and successful in controlling odors from the operation. *Id.* r. 2D.1802(i).

307. *Id.* r. 2D.1802(i)(1).

308. For what constitutes plan failure, *see id.* r. 2D.1802(j)(1)-(5).

309. *Id.* r. 2D.1802(k).

considering "human health, energy, environmental, and economic impacts and other costs."[310] The control technology must be applied no later than 12 months from the permit date.[311]

5. Special Provisions for Swine Odor Control: Moratoria and Facility Siting

In 1997, North Carolina imposed a moratorium on construction or expansion of swine farms with 250 or more hogs. Originally intended to last only a year, the moratorium has been extended three times and now expires 1 September 2007. The moratorium does not apply to operations with innovative technologies—that is, operations that do not use an anaerobic lagoon as the primary method of waste treatment and that use land application methods that meet specific criteria.[312] Among other requirements, land application methods must "[s]ubstantially eliminate the emission of odor that is detectable beyond the boundaries of the parcel or tract of land on which the swine farm is located."[313] The moratorium is designed to allow time to identify and test new technologies that will be environmentally sustainable.

The Swine Farm Siting Act[314] is intended to minimize interference with use and enjoyment of property adjoining swine farms. Under the Siting Act, a swine house or lagoon must be constructed at least 1,500 feet from any occupied residence, at least 2,500 feet from any school, hospital, church, outdoor recreation facility, national or state park, historic property or child care center, and at least 500 feet from any property boundary or drinking water well.[315] Moreover, the outer perimeter of land application of waste must be at least 75 feet from the boundary of property where an occupied residence is located and from surface watercourses.[316] The odor control rules described above

310. *Id.* r. 2D.1802(k)(1).

311. *Id.* r. 2D.1802(k)(2).

312. N.C. GEN. STAT. § 143-215.10A note. 1997 N.C. Sess. Laws 458, § 1.1, as amended by 1998 N.C. Sess. Laws 188, § 2; 1999 N.C. Sess. Laws 329, § 2.1; 2001 N.C. Sess. Laws 254, § 1; 2003 Sess. Laws 266, § 1.

In 2003, North Carolina had about 2,300 swine operations with more than 250 head. Office of the Governor, Gov. Easley Calls for 4-Year Extension of Hog Moratorium, Press Release, Apr. 15, 2003, *available at* http://www.ncgov.com/asp/subpages/news_release_view.asp?nrid=715.

313. N.C. GEN. STAT. § 143-215.10A, Moratorium On Swine Farm Construction Or Expansion, (b)(7)(c).

314. *Id.* §§ 106-801 to -805.

315. *Id.* § 106-803(a). Setbacks do not apply if the neighboring property owner agrees in a writing recorded with the Register of Deeds. *Id.* § 106-803(b).

316. *Id.* § 106-803(a)(1). *See also* N.C. ADMIN CODE tit. 15A, r. 2D.1802(*l*)(3)(A)-(B).

incorporate the setbacks and land application restrictions from the Act.[317]

Before beginning construction, the owner or operator of a new or modified swine operation must have an approved best management plan and follow statutory setbacks for construction of animal housing and lagoons.[318] The Siting Act also imposes a notice requirement. A person who plans to construct a swine operation with an animal waste management system that requires an NPDES permit must notify adjoining property owners (including those across roads, streets, or highways), the county, and the local health department.[319] The notice is intended to inform neighbors and others about the type of swine farm and design capacity of the animal waste management system, as well as to allow an opportunity to submit written comments about the planned facility to the Division of Water Quality.[320]

6. Local Government Authority to Regulate AFOs

North Carolina counties have authority to regulate the location and use of buildings, structures and land to promote public health, safety and the general welfare.[321] Except in narrow circumstances, however, counties may not adopt ordinances that "affect property used for bona fide farm purposes."[322] Pursuant to a 1997 amendment, counties may enact ordinances to govern swine operations using an animal waste management system with a design capacity of 600,000 or more pounds steady state live weight (about 4000 finishing hogs[323]), but may not exclude even these large swine operations from the entire zoning jurisdiction.[324]

The North Carolina Supreme Court has indicated that county authority to regulate large swine operations will be construed narrowly and that ordinances that regulate too broadly will be preempted by the Swine Farm Siting Act and the Animal Waste Management Systems Act.[325]

317. N.C. ADMIN CODE tit. 15A, r. 2D.1802(*l*)(1), (3).
318. *Id.* r. 2D.1802(*l*)(1)(A)-(C).
319. N.C. GEN. STAT. § 106-805. Notice must be given by certified mail.
320. *Id.*
321. *Id.* § 153A-340(a).
322. *Id.* § 153A-340(b).
323. Charles W. Abdalla & John C. Becker, *Jurisdictional Boundaries: Who Should Make the Rules of the Regulatory Game?*, 3 DRAKE J. AGRIC. L. 7, 25 (1998).
324. N.C. GEN. STAT. § 153A-340(b)(3).
325. Craig v. County of Chatham, 565 S.E.2d 172 (N.C. 2002). The appellate court decision is Craig v. County of Chatham, 545 S.E.2d 455 (N.C. App. 2001). For a critical analysis, *see* Christy Noel, Recent Development, *Preemption Hogwash: North Carolina's Judicial Repeal of Local Authority to Regulate Hog Farms in Craig v. County of Chatham*, 80 N.C. L. REV. 2121 (2002).

III. Designing a State Program to Control Air Emissions from AFOs

The preceding review of selected laws and regulations in important livestock states indicates that states have used a number of techniques to control air emissions from AFOs. State programs set emission limits, require use of best management practices, and impose other pre-operational and operational requirements. In some states, local governments also play a role, for example, when state programs invite county participation in the permit process or local implementation and enforcement of standards.

The US EPA has indicated its interest in regulating air emissions from AFOs, and it seems likely that federal regulations, issued under authority of the CAA, will be enacted in the near future, perhaps after a period of monitoring and study.[326] States play an important role in implementing federal CAA requirements, often through their CAA state implementation plan. In light of the prospect of federal regulation and the resulting state implementation responsibilities, the following material draws from the state laws already examined to suggest effective elements of a state CAA regulatory program for AFOs.

A. Permits by Rule and Consolidated Air and Water Quality Permits

Missouri and Texas allow CAA permits by rule for qualified AFOs, and Texas offers consolidated air and water quality authorizations. Permits by rule and general permits are efficient means to authorize facilities with minimal individualized administrative input. Consolidation of air and water quality permits helps to avoid duplication of efforts by both administrators and producers. Information submitted by producers for NPDES permits—from basic location information and animal numbers to detailed operational specifications—also describes the operation for purposes of air quality evaluation and can be cross-referenced easily in agency evaluations.

States that enact air emission standards for AFOs must determine what operations, if any, qualify for a permit-by-rule or general permit program. Existing permit-by-rule programs raise questions of eligibility. For example, regulators might ask if a permit-by-rule program is appropriate if AFOs, as a category or individually, exceed federal or state emission limitations for specific pollutants. In Texas, for example, the permit by rule can apply only to facilities that will not significantly emit air contaminants and that do not emit more than 25 tpy of certain air contaminants. If an AFO exceeds regulatory standards for any contaminant (e.g., hydrogen sulfide or particulate matter), one might

326. *See supra* text accompanying notes 20-23.

argue that the permit-by-rule program should not apply because the facility significantly contributes air contaminants to the atmosphere. Further, Texas exempts some AFOs (which are not CAFOs) from the CAA permit-by-rule program if water quality management plans are in place. Reduced air emissions result only indirectly from water quality measures. Though the exemption applies to smaller facilities, it might be more desirable to require even those facilities to follow specific management practices directed toward reducing air emissions and odor.

States that are still revising their NPDES regulations to implement the new federal CAFO rules have the opportunity to consider a consolidated permit system. At a minimum, in the expectation of federal regulation of air emissions, states could evaluate the information generated in NPDES permit applications and determine what other information should be required for a consolidated water and air permit. Regulatory amendments would be required, and inter- or intra-agency cooperation would be necessary, at least in states where air and water quality permits are now issued by different entities. NPDES permits are not required for all livestock facilities, but AFOs exempt from the NPDES requirement might well be required to apply for an "air quality only" permit.

B. Emission Limitations

The recent NRC report on air emissions from AFOs indicated that substances emitted from AFOs cause concern, and that different substances have effects locally, nationally, or globally. The type and amount of emissions depend in part on the species of animal and the type of confinement facility and waste management system. Moreover, the report indicated that scientists have not yet developed adequate methods for measuring those emissions or techniques for controlling them, and that further research should be conducted.[327] The EPA is likely to enact regulatory standards for AFOs on the basis of current research efforts.[328] States that already regulate air emissions from AFOs and enforce their standards will have a head start in implementing federal CAA rules. Programs and experiences in some states, e.g., the lagoon cover requirement in Colorado, may eventually provide helpful data and guidance for other state programs.

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327. AIR EMISSIONS, *supra* note 8.

328. *See, e.g.*, the EPA-livestock industry negotiations mentioned *supra* text accompanying note 23.

1. Pollutants of Local Concern: Hydrogen Sulfide, Particulate Matter, and Odors

The NRC report recommended that EPA measure and control air emissions that have a local effect—hydrogen sulfide, particulate matter, and odor—either at the boundary of the AFO and/or at the nearest occupied dwelling.[329] The review of state legislation indicates that hydrogen sulfide and odor emissions from AFOs have received significant attention. Of the states considered by this article, however, none has established a particulate matter standard specifically for AFOs. Moreover, the Minnesota legislature prohibited the application of the state's particulate matter standard to AFOs.

Regulatory changes in California may provide insight for other states. Some agricultural regions in California are located in areas of non-attainment for particulate matter, and livestock facilities contribute to the particulates. New rules in the San Joaquin Valley, for example, will require better management of dust and other particulate matter.[330]

Of the states surveyed, Minnesota is the only state that has specific provisions for AFOs in its emission limitation for hydrogen sulfide. Monitoring protocols and results, as well as correlations between operational requirements and compliance with the standard, may be available to guide other states. Recent regulations in Iowa have taken a different approach for hydrogen sulfide. The Iowa Department of Natural Resources finalized a rule establishing a health effects value and health effects standard for hydrogen sulfide to be used during a field study of AFOs. Data from the study may be helpful as other states develop emission standards for hydrogen sulfide. Although Missouri and Texas have enacted an emission standard for hydrogen sulfide, the standard does not refer specifically to AFOs, so data concerning its implementation to AFOs may not be available.

Because odor perception is subjective and therefore difficult to regulate,[331] the NRC report recommended that standardized methodologies be developed to measure odors objectively and that odor concentration be evaluated by a standard unit of measurement.[332] This standardization has not occurred in the states surveyed here—Missouri, Colorado and Illinois—that enacted a numerical odor standard. The

329. AIR EMISSIONS, *supra* note 8, at 6.

330. *See* Carol Pogash, *Faced With New Air Standards, California's Earthbound Farmers Are Wary*, N.Y. TIMES, July 1, 2004, at A14. *See also* San Joaquin Valley Air Pollution Control District, Rule 4550 (adopted May 20, 2004, readopted Aug. 19, 2004), *available at* http://www.valleyair.org/rules/currntrules/r4550.pdf.

331. AIR EMISSIONS, *supra* note 8, at 137.

332. *Id.* at 7.

Illinois standard is not tailored to AFOs and depends on whether the receptor is in an industrial or residential/commercial area. Colorado distinguishes between large commercial swine feeding operations and other types of agricultural operations. Missouri applies its odor standard to only the largest AFOs. Each state has a different detectable odor threshold, although each state measures odor as "no objectionable odor after dilution with (x) volumes of odor-free air." Although measurement methodologies differ among these states, each state specifies where the standard should be applied (property boundary of AFO versus separated location), the number of measurements to be taken, time between sampling, and the type of apparatus (e.g., the scentometer) to be used.

Although enforceable odor limitations are one method of regulating odor emissions, the majority of states surveyed do not maintain a specific odor limitation. Instead, these states require that facilities, often as a permit requirement, operate to prevent odors that cause a nuisance or submit an odor-management plan. Without an enforceable numerical standard, however, the effectiveness of these plans may depend in part on the subjective judgment of neighbors or regulators. An enforceable odor limitation, using standardized methodologies and units of measure, should be a part of any state air emissions program for AFOs.

2. Pollutants of Global, National and Regional Concern

The NRC report also recommends that regulators seek to decrease the aggregate emissions of polluting substances of global, national and regional concern.[333] Ammonia is one of these substances, but none of the surveyed states has an ammonia emission limit specifically for AFOs. Iowa may regulate ammonia (as well as hydrogen sulfide) from AFOs, after its AFO field study is completed. Although both Iowa and Minnesota have recommended further study of the effects of ammonia emissions, federal leadership in this area would facilitate regional cooperation to study, assess, and eventually reduce, ammonia emissions. For substances of national concern, like ammonia, the NRC report recommended control per unit of production rather than emissions per farm. Therefore, approaches other than emission limitations may be effective. These may include changes in farm practices or even reductions in the total number of animals in vulnerable geographic regions.[334]

333. AIR EMISSIONS, *supra* note 8, at 5-6. These include ammonia, methane, and nitrous oxide.

334. *Id.*

C. *Pre-Operational Requirements*

The permit application process in any state CAA program for AFOs should require basic information about the facility, including a map and description of the facility that identifies all potential sources of air pollution and distances between the facility and neighboring property. Most state programs require setbacks to avoid odor nuisances. Setback distances vary in the states surveyed, but are generally between one-quarter mile and one mile, depending on factors such as the size of the facility, the type of animal confined, and the land use (e.g., residence, business) on nearby property. Although a state might determine, as a matter of policy, that setbacks should always be required to avoid nuisances, one could argue that if a state implements a CAA program that successfully controls air emissions from AFOs, setback distances might be required only for large operations.

As part of the NPDES permit process, some states require applicants to submit design and construction specifications for waste management facilities. Although this effort need not be duplicated in a CAA permit program, regulators could require operators to identify and submit design specifications for devices used to control air emissions. Of course, a consolidated permit program would provide efficiencies for producers and administrators.

It should be noted here that some states, like Minnesota, require environmental assessments of some livestock facilities. Environmental assessments, followed if necessary by environmental impact statements, may help to eliminate water and air emissions in vulnerable areas. In states with permits by rule or general permits, an EA or EIS could accompany the general permit. It is interesting to note that the European Community Directive that governs environmental impact assessment requires an assessment for intensive pig and poultry facilities.[335]

D. *Pollution Prevention Plans and Operational Requirements*

An air emissions control plan is a critical element in any effort to minimize air emissions from AFOs. Therefore, a state program of regulation should require or recommend effective technologies and require large AFOs to submit an emissions control plan. Among the states surveyed in this article, some require pollution prevention plans and operational requirements that focus on water quality and do not

335. Council Directive 97/11/EEC, amending Directive 85/337 on the assessment of the effects of certain public and private projects on the environment, 1997 O.J. (L 73) 5, art. 4(1) & Annex 1(17). Thresholds are 900 places for sows, 3000 places for production pigs over 30 kg., 85,000 places for broilers, and 60,000 places for hens.

directly address air pollution (e.g., Iowa, North Carolina). Other states require plans only for swine (Colorado, North Carolina). A single pollution prevention plan that identifies techniques for controlling both water and air emissions would avoid duplication.

Because state regulations often focus on odor, odor may also be the main focus of existing pollution control plans. But when regulatory requirements for other harmful emissions are enacted, air pollution prevention plans should address these other pollutants, in addition to odors. Plans should be required for all species of confined animals, at least for large facilities.

In an effective air pollution control plan, the AFO operator will identify and commit to use best management practices at each source identified in the permit application, and identify mitigation measures to be applied if regulatory standards are exceeded. It may be helpful to operators if state regulations provide a comprehensive list of best management practices, as Missouri and Texas have done, instead of simply requiring best management practices. Missouri's rather stringent requirements could be a model for other states. In pollution control plans, Missouri requires applicants to list all innovative and proven odor control options, including add-on control devices to prevent, capture, treat, or disperse air pollutants. Applicants must also discuss and rank feasible options, and evaluate the most effective ones. This process may be helpful for other regulated air pollutants, and states may want to require consideration of the effect of control technologies for one pollutant on the emission of other substances. Based on this information, regulators could determine on a case-by-case basis whether specific control technology should become part of a permit requirement.

Operational monitoring, testing, sampling, record-keeping, and reporting, as required by Colorado's odor regulation, would assist not only in enforcement of air pollution control standards, but also in efforts to identify and quantify emissions from AFOs. An annual operations review, similar to the review required in North Carolina for water quality, may help to identify emissions problems. States could require operators to be certified, as required in Illinois, North Carolina and Missouri, and ensure that training for certification focuses specifically on control of air emissions. Lastly, states might consider enacting an environmental leadership program, like the one in Colorado, which rewards the use of innovative technologies that result in significant environmental benefits and consistent compliance with air pollution control laws.

E. Local Government Participation

In enacting regulation to govern air emissions from AFOs, state should consider whether local governments can, and should, play a role in the regulatory process. County efforts to use zoning and health ordinances to regulate livestock facilities suggest that local government have a real interest in the location and operation of these facilities. To varying degrees, both Minnesota and Texas delegate significant responsibilities to local governments in implementing AFO air emission programs. In contrast, counties in Iowa and Illinois play a less significant role in permit decisions. Iowa counties participate through non-binding matrix evaluations; Illinois counties may conduct public hearings and submit comments, but these contributions do not bind state administrators. Colorado, Missouri, and North Carolina seek public comment on swine facilities, although it appears that local governments do not coordinate these efforts.

This article has not addressed zoning statutes and decisions that involve livestock facilities. In some instances, the absence of meaningful input in the permit process, coupled with the perception that state standards are deficient, seems to have led counties to regulate AFOs through zoning and public health ordinances. One Missouri county's health ordinance has survived a legal challenge.[336] But the regulation of air emissions from AFOs locally to protect public health places the burden on localities to generate scientific data to support adverse health findings. One could argue that federal and state government should take the lead in studying the public health effects of AFO emissions and setting a protective standard, if deemed necessary, under the CAA and state CAA implementation program.

F. Research Programs

Preliminary monitoring of air emissions indicates that some large AFOs emit levels of air pollutants that would otherwise require a permit under CAA major source provisions. But because the federal government and others have not dedicated enough financial support or technical resources, neither reliable methods for estimating air emissions from AFOs nor effective mitigation strategies have been developed.[337] The NRC report on air emissions therefore noted that "[t]he scientific knowledge needed to guide regulatory and management actions requires close cooperation between the major federal agencies (EPA and USDA), the states, industry and environmental interest, and the research

336. *See supra* text accompanying note 156.
337. AIR EMISSIONS, *supra* note 8, at 11.

community, including universities."[338]

Although the federal government recently has moved to gather data on AFO emissions, states such as Minnesota and Iowa already have completed comprehensive studies of air emissions and identified research needs. Both states continue to study AFOs and their air emissions. Iowa is conducting its own two-year monitoring program and, by statute, Minnesota requires inter-agency cooperation in the study and development of standards. Federal authorities, as well as regulators in other states, can benefit from information generated at the state level, and should take cooperative steps to compare outcomes of research initiatives.

G. Concluding Observations

Intensive livestock operations raise large numbers of animals in confined quarters, and their presence affects the environment in rural communities and beyond. Some air emissions from AFOs affect neighbors, and other emissions have national and even global impacts. Because agricultural operations have been considered minor sources of air pollutants, emissions from most AFOs have escaped regulation under the federal CAA and its state implementation programs. State regulation of AFOs often focuses on water quality, with incidental provisions for air quality. Even states with measures for specific substances (odor, hydrogen sulfide) emitted by AFOs lack comprehensive regulatory systems.

The seven states surveyed in this article have enacted a number of measures to govern air emissions from livestock facilities. When research, encouraged by the US EPA, has developed accurate methods for measuring air emissions, AFOs can expect federal regulation under the CAA, followed by state implementation. In developing that regulation, the EPA may be advised to consider effective elements in state regulatory programs.

338. *Id.*