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CONCENTRATED ANIMAL FEEDING OPERATIONS

EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality

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Natural Resources and Environment

September 24, 2008

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EPA Needs More Information and a Clearly Defined Strategy to More Effectively Protect Air and Water Quality

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Highlights

Highlights of GAO-08-1177T, a testimony before the Subcommittee on Environment and Hazardous Materials, Committee on Energy and Commerce, House of Representatives

Why GAO Did This Study

Concentrated animal feeding operations (CAFO) are large livestock and poultry operations that raise animals in a confined situation. CAFOs may improve the efficiency of animal production, but the large amounts of manure they produce can, if improperly managed, degrade air and water quality. The Environmental Protection Agency (EPA) regulates CAFOs and requires CAFOs that discharge certain pollutants to obtain a permit.

This testimony summarizes the findings of a September 4, 2008 GAO report (GAO-08-944) on (1) trends in CAFOs, (2) amounts of waste they generate, (3) findings of key research on CAFOs' health and environmental impacts, (4) progress made in developing CAFO air emissions protocols, and (5) the effect of recent court decisions on EPA's regulation of CAFO water pollutants. GAO analyzed U.S. Department of Agriculture's (USDA) data from 1982 through 2002 for large farms as a proxy for CAFOs; reviewed studies, EPA documents, laws, and regulations, and obtained the views of federal and state officials.

What GAO Recommends

In the September 2008 report, GAO recommended that EPA complete its inventory of permitted CAFOs, reassess the air emissions monitoring study, and establish a strategy and timetable for developing a process-based model for measuring CAFO air emissions. EPA partially agreed with GAO's recommendations.

To view the full product, including the scope and methodology, click on GAO-08-1177T. For more information, contact Anu K. Mittal, (202) 512-3841, mittala@gao.gov.

What GAO Found

Because no federal agency collects accurate and consistent data on the number, size, and location of CAFOs, GAO could not determine the exact trends for these operations. However, using USDA data for large farms that raise animals as a proxy for CAFOs, it appears that the number of these operations increased by about 230 percent, from about 3,600 in 1982 to almost 12,000 in 2002. The number of animals raised on large farms also increased during this 20-year period, but the rate of increase varied by animal type. Moreover, EPA does not have comprehensive, accurate data on the number of permitted CAFOs nationwide. As a result, the agency does not have the information that it needs to effectively regulate these CAFOs. EPA is currently working with the states to establish a new national data base.

The amount of manure generated by large farms that raise animals depends on the type and number of animals raised, but these operations can produce from 2,800 tons to 1.6 million tons of manure a year. Some large farms that raise animals can generate more manure annually than the sanitary waste produced by some U.S. cities. Manure can be used beneficially to fertilize crops; but according to some agricultural experts, when animal feeding operations are clustered in certain geographic areas, the manure they produce may not be effectively used as fertilizer on adjacent cropland and could increase the potential of pollutants reaching nearby waters and degrading water quality.

Since 2002, at least 68 government-sponsored or peer-reviewed studies have been completed that examined air and water quality issues associated with animal feeding operations and 15 have directly linked air and water pollutants from animal waste to specific health or environmental impacts. EPA has not yet assessed the extent to which pollutants from animal feeding operations may be impairing human health and the environment because it lacks key data on the amount of pollutants being discharged by these operations.

Considered a first step in developing air emission protocols for animal feeding operations, a 2-year nationwide air emission monitoring study, largely funded by the industry, was initiated in 2007. However, the study, as currently structured, may not provide the scientific and statistically valid data it was intended to provide and that EPA needs to develop these protocols. In addition, EPA has not yet established a strategy or timetable for developing a more sophisticated process-based model that considers the interaction and implications of all emission sources at an animal feeding operation.

Two recent federal court decisions have affected EPA's ability to regulate water pollutants discharged by CAFOs. The 2005 *Waterkeeper* decision required EPA to abandon the approach that it had proposed for regulating CAFOs in 2003. Similarly, the *Rapanos* decision has complicated EPA's enforcement of CAFO discharges because EPA believes that it must now gather more evidence to establish which waters are subject to the Clean Water Act's permitting requirements.

Mr. Chairman and Members of the Subcommittee:

We are pleased to be here today to discuss our recently issued report on concentrated animal feeding operations (CAFO).[1] As you know, CAFOs are large animal livestock and poultry operations that raise animals in confined situations. While CAFOs have improved the efficiency of the animal production industry, they have also raised environmental and health concerns because the large amounts of manure they can produce, if not properly managed, may degrade air and water quality. Animal manure can be, and frequently is, used beneficially on farms to fertilize crops and restore nutrients to soil. However, if manure and wastewater from animal feeding operations are improperly managed, pollutants such as nitrogen, phosphorus, bacteria, and organic matter could enter nearby water bodies and could potentially impair human health and damage the environment. Improperly managed manure can also result in emissions to the air of particles and gases, such as ammonia and hydrogen sulfide, which could also result in potentially harmful environmental and human health effects.

The Environmental Protection Agency (EPA) has the authority under several federal laws to regulate water and air pollutants from CAFOs. EPA has specific authority under the Clean Water Act to regulate CAFOs like any other industry if they discharge into federally regulated waters.[2] Such CAFOs must obtain permits, from EPA or the states that EPA has authorized to administer this act, that stipulate how they will manage their discharges. In contrast, three other laws—the Clean Air Act, the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERLCA), and the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA)—while not specifically citing CAFOs as regulated entities, provide EPA with certain authorities related to air emissions from these operations.

Our testimony today summarizes the following five issues that we examined in our recent report: (1) trends in CAFOs; (2) the amount of waste they generate; (3) the findings of recent key academic, industry, and government research on the impacts of air and water pollutants from

[1]GAO, *Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of Concern*, GAO-08-944 (Washington, D.C.: Sept. 4, 2008).

[2]Section 502(14) of the Clean Water Act specifically defines point sources of pollution to include CAFOs.

CAFOs on human health and the environment, and the extent to which EPA has assessed the nature and severity of such impacts; (4) the progress that EPA and the states have made in regulating and controlling the emissions of, and in developing protocols to measure, air pollutants from CAFOs that could affect air quality; and (5) the extent to which recent court decisions have affected EPA and the states' ability to regulate CAFO discharges that impair water quality. In conducting this work, we reviewed laws and regulations, federal and state agencies' documents, and met with officials from EPA and the U.S. Department of Agriculture (USDA), industry, citizen and environmental groups, and academia. We also spoke with state officials and visited CAFOs in eight states.[3] In addition, we analyzed USDA data for large farms as a proxy for CAFOs, conducted library and Internet searches to identify key studies completed since 2002 on air and water pollutants from animal waste, and contacted state officials in all 50 states to determine which states had developed air emission regulations applicable to CAFOs and how recent court decisions had affected their ability to regulate CAFO discharges that impair water quality. We conducted our work between July 2007 and August 2008 in accordance with generally government auditing standards. These standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

In summary we found the following:

- Determining the trends in the number of CAFOs over time is difficult because no federal agency collects consistent, reliable data on CAFOs. However, USDA data for large farms that raise animals can serve as a proxy for estimating trends in the number and size of CAFOs. Using these data, we found that the number of these operations appears to have increased by about 230 percent from 1982 through 2002, from about 3,600 to almost 12,000. Moreover, the number of animals per farm increased, but the increase varied by animal type, with hog farms showing the largest increase at 37 percent. Although EPA has been compiling data from its regional offices in an effort to develop information on the number of permitted CAFOs nationwide, we found that the data are inconsistent and inaccurate and do not provide necessary information on the number and

[3]These states were Arkansas, California, Colorado, Iowa, Maryland, Minnesota, North Carolina, and Texas.

characteristics of permitted CAFOs. We recommended that the agency develop a complete and accurate inventory of permitted CAFOs and incorporate appropriate internal controls to ensure the quality of the data. EPA concurred with this recommendation and stated that it is currently working with its regional offices and the states to develop and implement a national data system to collect and record facility-specific information on permitted CAFOs.

- While the amount of manure generated by large farms that raise animals depends on the type and number of animals raised, such farms can produce from over 2,800 tons to more than 1.6 million tons of manure a year. In order to provide a perspective on how much manure these operations produce, we compared the manure from some large farms that raise animals with sanitary waste produced by the populations of some U.S. cities. For example, a very large hog farm raising as many as 800,000 hogs—of which there are at least two in the United States—could generate more than 1.6 million tons of manure annually, or more than one-and-a-half times the sanitary wastes produced by the about 1.5 million residents of Philadelphia, Pennsylvania. While we recognize that manure can be a valuable resource used as fertilizer, some agricultural experts and government officials have raised concerns about the amount of manure produced by large feeding operations located within a specific geographic area. When such clustering of large operations occurs, the manure they produce may not be effectively used as fertilizer on adjacent cropland and could increase the potential for pollutants to reach nearby waters and degrade water quality.

- At least 68 government-sponsored or peer-reviewed studies have been completed on air and water pollutants from animal feeding operations since 2002. Of these 68 studies, 15 directly linked air and water pollutants from animal waste to specific health or environmental impacts, 7 found no impacts on human health and the environment, and 12 identified indirect linkages. Thirty-four other studies focused on measuring the amount of water or air pollutants from animal feeding operations that are known to cause harm to humans or the environment. However, EPA has not yet assessed the extent to which air and water pollutants from CAFOs may be impairing human health and the environment because it lacks key information on the amount of pollutants discharged by these operations.

- The ongoing national air emissions monitoring study is considered a first step in developing protocols for measuring and quantifying air pollutants emitted by animal feeding operations. While EPA believes that this 2-year study, initiated in 2007, will provide a scientific basis for estimating air emissions from animal feeding operations, concerns have been raised that

the study, as currently structured, may not provide EPA with the scientific and statistically valid data that it needs to develop these protocols. For example, the study does not include all of the combinations of animal types and geographic regional pairings recommended by EPA's expert panel that would be representative of the animal feeding operations in the United States. Furthermore, EPA has not yet established a strategy or timetable for developing a more sophisticated process-based model that the National Academy of Sciences believed is needed to ensure that the interaction and implications of all emission sources at an animal feeding operation are accounted for. Finally, some EPA actions have made it unclear at this time how the agency intends to regulate air emissions from animal feeding operations once the current air emissions study is complete. For instance, EPA has not decided if it will aggregate the emissions occurring on an animal feeding operation or if the emissions from barns and manure storage areas will be considered separately when determining if an operation has exceeded air emissions thresholds. Moreover, in December 2007, EPA proposed a rule to exempt all releases of hazardous substances, such as ammonia and hydrogen sulfide, to the air from manure on farms, including animal feeding operations, from reporting requirements of certain federal laws. We recommended that EPA take a number of actions to address the concerns that we identified with the ongoing air emissions study. EPA partially agreed with our recommendations and described a number of actions that it has underway to address them.

- Two recent federal court decisions have affected EPA's ability to regulate water pollutants discharged by CAFOs. First, in the 2005 *Waterkeeper Alliance Inc. v. EPA* decision, the U.S. Court of Appeals for the Second Circuit set aside a key provision of a CAFO rule EPA had issued in 2003. This rule would have provided EPA with comprehensive information on the universe of CAFOs and their operations and would have subjected a large number of previously unregulated CAFOs to monitoring and reporting requirements as well as periodic inspections. However, the court concluded that EPA did not have the authority under the Clean Water Act to require CAFOs that were not discharging, or proposing to discharge, pollutants into federally regulated waters to apply for permits. The decision has forced EPA to revise its 2003 rule for permitting CAFOs and return to its approach in which CAFO operators determine for themselves whether they need to apply for a federal permit. To help identify unpermitted discharges, EPA must rely on other means to acquire information about CAFOs that are illegally discharging pollutants, such as following up on citizen reports of potential pollutants. Second, the 2006 Supreme Court decision—*Rapanos v. United States*—has complicated EPA's enforcement of CAFO discharges. This decision has made

determination of Clean Water Act jurisdiction over certain types of waters more complex and, according to EPA, has required the agency to gather significantly more evidence to establish which waters are considered federal waters and subject to the Clean Water Act's permitting requirements. EPA enforcement officials told us that since the *Rapanos* decision the agency may be less likely to take enforcement actions since it may be more difficult to prove that a water body is federally regulated.

Background

The livestock and poultry industry is vital to our nation's economy, supplying meat, milk, eggs, and other animal products. However, the past several decades have seen substantial changes in America's animal production industries. As a result of domestic and export market forces, technological changes, and industry adaptations, food animal production that was integrated with crop production has given way to fewer, larger farms that raise animals in confined situations. These large-scale animal production facilities are generally referred to as animal feeding operations. CAFOs are a subset of animal feeding operations and generally operate on a much larger scale.

Most agricultural activities are considered to be nonpoint sources of pollution because the pollution that occurs is in conjunction with soil erosion caused by water and surface runoff of rain or snowmelt from diffuse areas such as farms or rangeland. However, the Clean Water Act specifically designates point sources of pollution to include CAFOs, which means that under the act, CAFOs that discharge into federally regulated waters are required to obtain a National Pollutant Discharge Elimination System (NPDES) permit. These permits generally allow a point source to discharge specified pollutants into federally regulated waters under specific limits and conditions. EPA, or the states that EPA has authorized to administer the Clean Water Act, are responsible for issuing these permits.[4]

In accordance with the Clean Water Act's designation of CAFOs as point sources, EPA defined which poultry and livestock facilities constituted a CAFO and established permitting requirements for CAFOs. According to EPA regulations, first issued in 1976, to be considered a CAFO a facility

[4]Currently, 45 states are authorized to administer the NPDES permit program and their programs must be at least as stringent as the federal program. EPA has retained program authority for Alaska, Idaho, Massachusetts, New Hampshire, and New Mexico. Oklahoma has been authorized to issue permits for most sources, but not CAFOs.

must first be considered an animal feeding operation. Animal feeding operations are agricultural operations where the following conditions are met:

- animals are fed or maintained in a confined situation for a total of 45 days or more in any 12-month period, and
- crops, vegetation, forage growth, or post harvest residues are not sustained during normal growing seasons over any portion of the lot.

If an animal feeding operation met EPA's criteria and met or exceed minimum size thresholds based on the type of animal being raised, EPA considered the operation to be a CAFO. For example, an animal feeding operation would be considered a CAFO if it raised 1,000 or more beef cattle, 2,500 pigs weighing more than 55 pounds, or 125,000 chickens.[5] In addition, EPA can designate an animal feeding operation of any size as a CAFO if it meets certain criteria, such as being a significant contributor of pollutants to federally regulated waters.[6]

In January 2003, we reported that although EPA believed that many animal feeding operations degrade water quality, it had placed little emphasis on its permit program and that exemptions in its regulations allowed as many as 60 percent of the largest operations to avoid obtaining permits.[7] In its response to our 2003 report, EPA acknowledged that the CAFO program was hampered by outdated regulations. The agency subsequently revised its permitting regulations for CAFOs to eliminate the exemptions that allowed most animal feeding operations to avoid regulation. The revisions, issued in February 2003, also known as the 2003 CAFO rule, resulted, in part, from the settlement of a 1989 lawsuit by the Natural Resources Defense Council and Public Citizen. These groups alleged that EPA had failed to comply with the Clean Water Act. EPA's 2003 CAFO Rule included the following key provisions:

[5]40 C.F.R. § 122.23(b).

[6]Federally regulated waterways include waters of the United States as defined in 33 C.F.R. §328.3(a)(1)-(7) and may include rivers, wetlands, impoundments, the territorial seas, andwaters used in interstate commerce.

[7]GAO, *Livestock Agriculture: Increased EPA Oversight Will Improve Environmental Program for Concentrated Animal Feeding Operations*, GAO-03-285 (Washington, D.C.: Jan. 16, 2003).

- *Duty to apply*. All CAFOs were required to apply for a permit under the Clean Water Act unless the permitting authority determined that the CAFO had no potential to discharge to federally regulated waters.

- *Expanded CAFO definitions*. All types of poultry operations, as well as all stand-alone operations raising immature animals, were included in the 2003 CAFO Rule.

- *More stringent design standard for new facilities in the swine, poultry, and veal categories*. The 2003 rule established a no-discharge standard for new facilities that could be met if they were designed, constructed, and operated to contain the runoff from a 100-year, 24-hour storm event.

- *Best management practices*. Operations were required to implement best management practices for applying manure to cropland and for animal production areas.

- *Nutrient management plans*. CAFO operations were required to develop a plan for managing the nutrient content of animal manure as well as the wastewater resulting from CAFO operations, such as water used to flush manure from barns.

- *Compliance schedule*. The 2003 rule required newly defined CAFOs to apply for permits by April 2006 and existing CAFOs to develop and implement nutrient management plans by December 31, 2006.[8]

According to EPA officials, the 2003 rule was expected to ultimately lead to better water quality because the revised regulations would extend coverage to more animal feeding operations that could potentially discharge and contaminate water bodies and subject these operations to periodic inspections.

Three laws provide EPA with certain authorities related to air emissions from animal feeding operations, but, unlike the Clean Water Act, they do not specifically cite CAFOs as regulated entities. The Clean Air Act[9] regulates any animal feeding operation, regardless of size, that exceeds established air emission thresholds for certain pollutants. For example, in certain specific situations, hydrogen sulfide, ammonia, or particulate

[8]In July 2007, EPA extended these deadlines to February 27, 2009.

[9]The Clean Air Act, 42 U.S.C. §§7401-7671q.

matter may be regulated. In addition, Section 103 of CERCLA and Section 304 of EPCRA[10] require owners or operators of a facility to report to federal, state, or local authorities when a "reportable quantity" of certain hazardous substances, such as hydrogen sulfide or ammonia,[11] is released into the environment. Together, CERCLA's and EPCRA's reporting requirements provide government authorities, emergency management agencies, and citizens the ability to know about the source and magnitude of hazardous releases.

EPA also works with USDA to address the impacts of animal feeding operations on air and water quality and human health. In 1998, EPA entered into a memorandum of understanding with USDA that calls for the agencies to coordinate on air quality issues related to agriculture and share information. In addition, in 1999, the two agencies issued a unified national strategy aimed at having the owners and operators of animal feeding operations take actions to minimize water pollution from confinement facilities and land application of manure. To help minimize water pollution from animal feeding operations and meet EPA's regulatory requirements, USDA, through its Natural Resources Conservation Service, provides financial and technical service to CAFO operators in developing and implementing nutrient management plans.

The Number of Large Farms Raising Animals Has Increased, but Specific Data on CAFOs Are Not Available

Because no federal agency collects accurate and consistent data on the number, size, and location of CAFOs, it is difficult to determine precise trends in CAFOs. According to USDA officials, the data USDA collects for large farms raising animals can be used as a proxy for estimating trends in CAFOs nationwide. Using these data, we determined the following:

- Between 1982 and 2002, the number of large farms raising animals increased from about 3,600 to almost 12,000, or by about 234 percent. Growth rates varied dramatically by animal type. For instance, broiler chickens farms showed the largest increase, almost 1,200 percent, followed by hogs at more than 500 percent. In comparison, beef cattle farms grew by only 2 percent and layer chicken farms actually declined by 2 percent.

[10]CERCLA, Pub. L. No. 96-510, 94 Stat. 2767 (codified as amended at 42 U.S.C. §§9601-9675)and EPCRA, Pub. L. No. 99-499, Tit. III, 100 Stat. 1728 (codified as amended at 42 U.S.C. §§11001-11050).

[11]Each of these hazardous substances has a reportable quantity of 100 pounds in a 24-hour period.

- The size of these farms also increased between 1982 and 2002. The layer and hog sectors had the largest increases in the median number of animals raised per farm, both growing by 37 percent between 1982 and 2002. In contrast, large farms that raised either broilers or turkeys only increased slightly in size, by 3 and 1 percent, respectively, from 1982 to 2002.

- The number of animals raised on large farms increased from over 257 million in 1982 to over 890 million in 2002—an increase of 246 percent. Moreover, most of the beef cattle, hogs, and layers raised in the United States in 2002 were raised on large farms. Specifically, 77 percent of beef cattle and 72 percent of both hogs and layers were raised on large farms.

We also found that EPA does not systematically collect nationwide data to determine the number, size, and location of CAFOs that have been issued permits nationwide. Instead, since 2003, the agency has compiled quarterly estimates obtained from its regional offices or the states on the number and types of CAFOs that have been issued permits. However, these data are inconsistent and inaccurate and therefore do not provide EPA with the reliable data that it needs to identify permitted CAFOs nationwide. Without a systematic and coordinated process for collecting and maintaining accurate and complete information on the number, size, and location of CAFOs nationwide, EPA does not have the information it needs to effectively monitor and regulate these operations. In our report, we recommended that EPA develop a national inventory of permitted CAFOs and incorporate appropriate internal controls to ensure the quality of the data it collects. In response to our recommendation, EPA stated that it is currently working with its regional offices and states to develop and implement a new national data system to collect and record facility-specific information on permitted CAFOs.

Large Farms That Raise Animals Can Produce Thousands of Tons of Manure Each Year, and Regional Clustering of Farms Can Exacerbate Manure Management Problems

The amount of manure a large farm that raises animals can generate primarily depends on the types and numbers of animals raised on that farm, but can range from over 2,800 tons to more than 1.6 million tons a year.[12] To further put this in perspective, the amount of manure produced by large farms that raise animals can exceed the amount of sanitary waste produced by some large U.S. cities.[13] For example:

- A dairy farm meeting EPA's large CAFO threshold of 700 dairy cows can create about 17,800 tons of manure annually, which is more than the about 16,000 tons of sanitary waste generated per year by the almost 24,000 residents of Lake Tahoe, California.
- A large farm with 800,000 hogs could produce over 1.6 million tons of manure per year, which is one and a half times more than the annual sanitary waste produced by the city of Philadelphia, Pennsylvania—about 1 million tons—with a population of almost 1.5 million.[14]

Although manure is considered a valuable commodity, especially in states with large amounts of farmland, like Iowa, where it is used as fertilizer for field crops, in some parts of the country, large farms that raise animals can be clustered in a few contiguous counties. Because this collocation can result in the separation of animal from crop production, there is less cropland on which manure can be applied as a fertilizer. A USDA report first identified this concern as early as 2000, when it found that between 1982 and 1997, as livestock production became more spatially concentrated, when manure was applied to cropland, crops were not fully using the nutrients in manure, and this could result in ground and surface water pollution from the excess nutrients.[15] According to the report, the number of counties where farms produced more manure nutrients, primarily nitrogen and phosphorus, than could be applied to the land

[12]The amounts of manure reported are estimates. The actual amount of manure produced by an animal will vary based on, among other things, feeding programs, feed used, climatic conditions, production techniques, and animal genetics.

[13]Human sanitary waste includes urine and feces only; it does not include any other household sewage wastes such as water from washing dishes or clothes or water used for showers or flushing.

[14]EPA officials told us that the agency has identified a hog farm of this size and USDA officials told us that they are aware of two hog farms of this size.

[15]R. L. Kellogg, C.H. Lander, D. C. Moffitt, and N. Gollehon. *Manure Nutrients Relative to the Capacity of Cropland and Pastureland to Assimilate Nutrients: Spatial and Temporal Trends for the United States*. (Washington, D.C.: December 2000).

without accumulating nutrients in the soil increased. As a result, the potential for runoff and leaching of these nutrients from the soil was high, and water quality could be impaired. Agricultural experts and government officials who we spoke to during our review echoed the findings of USDA's report and provided several examples of more recent clustering trends that have resulted in degraded water quality. For example, according to North Carolina agricultural experts, excessive manure production from CAFOs in five contiguous counties has contributed to the contamination of some of the surface and well water in these counties and the surrounding areas.

USDA officials acknowledge that regional clustering of large animal feeding operations has occurred, but they told us that they believe producers' implementation of nutrient management plans and use of new technologies, such as calibrated manure spreaders and improved animal feeds, have resulted in animal feeding operations more effectively using the manure being generated and reducing the likelihood that pollutants from manure are entering ground and surface water. However, USDA could not provide us with information on the extent to which these techniques are being used or their effectiveness in reducing water pollution from animal waste.

Studies Have Identified Impacts of Pollutants from Animal Waste, but EPA Has Not Assessed the Extent of Such Impacts

Since 2002, at least 68 government-sponsored or peer-reviewed studies have been completed on air and water pollutants from animal feeding operations. Of these 68 studies,

- *15 directly linked pollutants from animal waste generated by animal feeding operations to specific health or environmental impacts*. Eight of these 15 studies were water quality studies and 7 were air emissions studies. Academic experts and industry and EPA officials told us that only a few studies directly link CAFOs with health or environmental impacts because the same pollutants that CAFOs discharge also often come from other sources, including smaller livestock operations; row crops using commercial fertilizers; and wastes from humans, municipalities, or wildlife, making it difficult to distinguish the actual source of the pollution.

- 7 *found no impacts on human health or the environment from pollutants emitted by CAFOs*. Four of these 7 studies were water quality studies and 3 were air emissions studies. According to EPA and academic experts we spoke with, the concentrations of air and water pollutants discharged by animal feeding operations can vary for numerous reasons, including the type of animal being raised, feed being used and the manure management

system being employed, as well as the climate and time of day when the emissions occur.

- *12 made indirect linkages between air and water pollutants and health and environmental impacts.* While these studies found that animal feeding operations were the likely cause of human health or environmental impacts occurring in areas near the operations, they could not conclusively link waste from animal feeding operations to the impacts, often because other sources of pollutants could also be contributing.

- *34 of the studies focused on measuring the amounts of water or air pollutants discharged by animal feeding operations that are known to cause human health or environmental impacts at certain concentrations.* Of the 34 studies, 19 focused on water pollutants and another 15 focused on measuring air emissions from animal feeding operations.

  While EPA recognizes the potential impacts that water and air pollutants from animal feeding operations can have on human health and the environment, it lacks the data necessary to assess how widespread the impacts are and has limited plans to collect the data that it needs. For example, with regard to water quality, EPA officials acknowledged that the potential human health and environmental impacts of some CAFO water pollutants, such as nitrogen, phosphorus, and pathogens, are well known. However, they also stated that EPA does not have data on the number and location of CAFOs nationwide and the amount of discharges from these operations. Without this information and data on how pollutant concentrations vary by type of operation, it is difficult to estimate the actual discharges occurring and to assess the extent to which CAFOs may be contributing to water pollution. Although EPA has recently taken some steps that may help provide some of these data, agency officials told us that EPA currently has no plans to conduct a national study to collect information on CAFO water pollutant discharges because of a lack of resources.

  Similarly, with regard to air quality, more recently, EPA has recognized concerns about the possible health and environmental impacts from air emissions produced by animal feeding operations. In this regard, prompted in part by public concern, EPA and USDA commissioned a 2003 study by the National Academy of Sciences (NAS) to evaluate the scientific information needed to support the regulation of air emissions

from animal feeding operations.[16] The NAS report identified several air pollutants from animal feeding operations, such as ammonia and hydrogen sulfide, that can impair human health. The NAS report also concluded that in order to determine the human health and environmental effects of air emissions from animal feeding operations, EPA and USDA would first need to obtain accurate estimates of emissions and their concentrations from animal feeding operations with varying characteristics, such as animal type, animal feed, manure management techniques, and climate. In 2007, the 2-year National Air Emissions Monitoring Study was initiated to collect data on air emissions from animal feeding operations as part of a series of consent agreements that EPA entered into with individual CAFOs. This study, funded by industry and approved by EPA, is intended to help the agency determine how to measure and quantify air emissions from animal feeding operations. The data collected will in turn be used to estimate air emissions from animal feeding operations with varying characteristics. According to agency officials, until EPA can determine the actual level of air pollutants being emitted by CAFOs, it will be unable to assess the extent to which these emissions are affecting human health and the environment.

It Is Unclear if EPA's Efforts to Develop Air Emissions Protocols for Animal Feeding Operations Will Be Effective and Whether EPA Intends to Regulate These Emissions in the Future

The National Air Emissions Monitoring Study is intended to provide a scientific basis for estimating air emissions from animal feeding operations and to help EPA develop protocols that will allow it to determine which operations do not comply with applicable federal laws. According to EPA, although it has the authority to require animal feeding operations to monitor their emissions and come into compliance with the Clean Air Act on a case-by-case basis, this approach has proven to be time and labor intensive. As an alternative to the case-by-case approach, in January 2005, EPA offered animal feeding operations an opportunity to sign a voluntary consent agreement and final order, known as the Air Compliance Agreement. Almost 13,900 animal feeding operations were approved for participation in the agreement, representing the egg, broiler chicken, dairy, and swine industries. Some turkey operations volunteered but were not approved because there were too few operations to fund a monitoring site, and the beef cattle industry chose not to participate. In return for participating in this agreement and meeting certain requirements, EPA agreed not to sue participating animal feeding

[16]National Academy of Sciences, *Air Emissions from Animal Feeding Operations: Current Knowledge, Future Need. (*Washington, D.C.: National Academies Press, 2003).

operations for certain past violations or violations occurring during the National Air Emissions Monitoring Study.[17]

Although EPA told us that the National Air Emissions Monitoring Study is the first step in developing comprehensive protocols for quantifying air emissions from animal feeding operations, we found that the study may not provide EPA with the data that it needs for the following three reasons.

- The monitoring study may not be representative of the vast majority of participating animal feeding operations and will not account for differences in climatic conditions, manure-handling methods, and density of operations because it does not include the 16 combinations of animal types and geographic regional pairings recommended by EPA's expert panel. EPA approved only 12 of the 16 recommended combinations, excluding southeastern broiler, eastern layer, midwestern turkey, and southern dairy operations.

- Selection of monitoring sites has been a concern since the selection plan was announced in 2005. At that time, many agricultural experts, environmental groups, and industry and state officials disagreed with the site selection methodology. They stated that the study did not include a sufficient number of monitoring sites to establish a statistically valid sample. Without such a sample, we believe that EPA will not be able to accurately estimate emissions for all types of operations. More recently, in June 2008, the state of Utah reached an agreement with EPA to separately study animal feeding operations in the state because of the state's continuing concerns that the National Air Emissions Monitoring Study will not collect information on emissions from operations in Rocky Mountain states and therefore may not be meaningful for those operations that raise animals in arid areas.

- Agricultural experts also have raised concerns that the National Air Emissions Monitoring Study does not include other sources that can contribute significantly to emissions from animal feeding operations. For example, the monitoring study will not capture data on ammonia

[17]EPA placed certain conditions and limits on its agreement not to sue animal feeding operations participating in the Air Compliance Agreement. For example, EPA can continue to pursue cases that present an imminent and substantial endangerment to public health, welfare, or the environment. In addition, EPA's covenant not to sue only covers emissions from agricultural livestock and livestock waste and does not extend to generators or land application of animal waste.

emissions from feedlots and manure applied to fields. According to these experts, feedlots and manure on fields, as well as other excluded sources account for approximately half of the total ammonia emissions emitted by animal feeding operations.

Furthermore, USDA's Agriculture Air Quality Task Force has recently raised concerns about the quantity and quality of the data being collected during the early phases of the study and how EPA will eventually use the information.[18] In particular, the task force expressed concern that the technologies used to collect emissions data were not functioning reliably. At its May 2008 task force meeting, the members requested that the Secretary of Agriculture ask EPA to review the first 6 months of the study's data to determine if the study needs to be revised in order to yield more useful information.

EPA acknowledged that emissions data should be collected for every type of animal feeding operation and practice, but EPA officials stated that such an extensive study is impractical. Furthermore, they stated that the selected sites provide a reasonable representation of the various animal sectors. EPA has also indicated that it plans to use other relevant information to supplement the study data and has identified some potential additional data sources. However, according to agricultural experts, until EPA identifies all the supplemental data that it plans to use, it is not clear if these data, together with the emissions study data, will enable EPA to develop comprehensive air emissions protocols.

EPA has also indicated that completing the National Air Emissions Monitoring Study is only the first part of a multiyear effort to develop a process-based model for predicting overall emissions from animal feeding operations. A process-based model would capture emissions data from all sources and use these data to assess the interaction of all sources and the impact that different manure management techniques have on air emissions for the entire operation. For example, technologies are available to decrease emissions from manure lagoons by, among other things, covering the lagoon to capture the ammonia. However, if an operation spreads the lagoon liquid as fertilizer for crops, ammonia emissions could increase on the field. According to NAS, a process-based model is needed

[18]The Agricultural Air Quality Task Force, created in accordance with the 1996 farm bill, is charged with advising the Secretary of Agriculture with respect to providing oversight and coordination related to agricultural air quality, and consists of leaders in farming, industry, health, and science.

to provide scientifically sound estimates of air emissions from animal feeding operations that can be used to develop management and regulatory programs. Although EPA plans to develop a process-based model after 2011, it has not yet established a timetable for completing this model and, therefore, it is uncertain when EPA will have more sophisticated approaches that will more accurately estimate emissions from animal feeding operations.

Moreover, two recent EPA decisions suggest that the agency has not yet determined how it intends to regulate air emissions from animal feeding operations. Specifically:

- In December 2007, EPA proposed exempting releases to the air of hazardous substances from manure at farms that meet or exceed the reportable quantities from both CERCLA and EPCRA notification requirements. According to EPA, this decision was in part a response to language in congressional committee reports related to EPA's appropriations legislation for 2005 and 2006 that directed the agency to promptly and expeditiously provide clarification on the application of these laws to poultry, livestock, and dairy operations. In addition, the agency received a petition from the several poultry industry organizations seeking an exemption from the CERCLA and EPCRA reporting requirements for ammonia emissions from poultry operations on the grounds that ammonia emissions from poultry operations pose little or no risk to public health, and emergency response is inappropriate. In proposing the exemption, EPA noted that the agency would not respond to releases from animal wastes under CERCLA or EPCRA nor would it expect state and local governments to respond to such releases because the source and nature of these releases are such that emergency response is unnecessary, impractical, and unlikely. It also noted that it had received 26 comment letters from state and local emergency response agencies supporting the exemption for ammonia from poultry operations. However, during the public comment period ending on March 27, 2008, a national association representing state and local emergency responders with EPCRA responsibilities questioned whether EPA had the authority to exempt these operations until it had data from its monitoring study to demonstrate actual levels of emissions from animal feeding operations. This national association further commented that EPA should withdraw the proposal because it denied responders and the public the information

necessary to protect themselves from dangerous releases.[19] Furthermore, the proposal also seems to be a departure from EPA's past regulatory enforcement actions that have included charges of failing to comply with the release reporting requirements when bringing claims against producers for violating several environmental laws and is also contrary to one of the stated goals of the Air Compliance Agreement. We believe that the timing of this proposed exemption, before the National Air Emissions Monitoring Study has been completed, calls into question the basis for EPA's decision.

- EPA has also recently stated that it will not make key regulatory decisions on how certain federal air regulations apply to animal feeding operations until after 2011, when the National Air Emissions Monitoring Study is completed. For example, according to EPA, the agency will not issue guidance for several more years defining the scope of the term "source" as it relates to animal agriculture and farm activities. According to EPA, it has not yet decided if it will aggregate the emissions occurring on an animal feeding operation as one source or if the emissions from the barns, lagoons, feed storage, and fields will each be considered as a separate source when determining if an operation has exceeded air emissions' reportable quantities. Depending on the approach EPA takes, how emissions are calculated could differ significantly. For example, according to preliminary data EPA has received from an egg-laying operation in Indiana, individual chicken barns may exceed the CERCLA reportable quantities for ammonia. Moreover, if emissions from all of the barns on the operation are aggregated, they might be more than 500 times the CERCLA reportable quantities.

  To address the various concerns that we identified with the ongoing air emission monitoring study, we recommended that EPA (1) reassess the study to ensure that it will provide valid data which the agency can use to develop air emissions protocols and (2) provide stakeholders with information on the additional data that it plans to use to supplement the study. In addition, we recommended that EPA establish a strategy and timetable for developing a process-based model that will provide more sophisticated air emissions estimating methodologies for animal feeding operations. EPA responded that it has developed a quality assurance plan for the study but did not address other issues that we identified in our

[19]The National Association of SARA Title III Program Officials. The Superfund Amendments and Reauthorization Act (SARA) amended CERCLA on October 17, 1986, after the first 6 years of the program.

report, such as the validity of the study's sample and the omission of other sources that can contribute significantly to the air emission from animal feeding operations. Furthermore, although EPA concurred with the need to identify supplemental data and establish a strategy and timetable for developing a process-based model and described actions that it has underway, the agency provided no indication of when it will complete its plans to either identify the data it will use to augment the monitoring study or develop a process-based model.

Two Federal Court Decisions Have Affected EPA's and Some States' Ability to Regulate Water Pollutants Discharged by CAFOs

Two federal court decisions—*Waterkeeper Alliance Inc. v. EPA* and *Rapanos v. United States*—have affected EPA and some states' abilities to regulate CAFOs for water pollutants.

Waterkeeper Alliance Inc. v. EPA (*Waterkeeper*)

In its 2005 *Waterkeeper* decision, the U.S. Court of Appeals for the Second Circuit set aside a key provision of EPA's 2003 CAFO rule requiring every CAFO to apply for a permit. Under the 2003 rule, large numbers of previously unregulated CAFOs were required to apply for permits and would have been subject to monitoring and reporting requirements imposed by the permit as well as periodic inspections. According to EPA, the 2003 rule would have expanded the number of regulated CAFOs from an estimated 12,500 to an estimated 15,300, an increase of about 22 percent, and would have provided EPA with more comprehensive information on the number and location of CAFOs, enabling the agency to more effectively locate and inspect these operations nationwide.

However, in 2003, both environmental and agricultural groups challenged EPA's 2003 rule. The court agreed with the environmental groups' arguments that, among other things, EPA's 2003 rule did not adequately provide for public review and comment on a CAFO's nutrient management plan and instructed EPA to revise the rule accordingly. The court also agreed with the agricultural groups' arguments that EPA had exceeded its authority under the Clean Water Act by requiring CAFOs that were not discharging pollutants into federally regulated water to apply for permits

or demonstrate that they had no potential to discharge and therefore set aside the rule's permitting requirements for those CAFOs that did not discharge.

The *Waterkeeper* decision, in effect, returned EPA's permitting program to one in which CAFO operators are not required to apply for a NPDES permit unless they discharge, or propose discharging, into federally regulated waters. As a result, EPA must identify and prove that an operation has discharged or is discharging pollutants in order to require the operator to apply for a permit. To help identify unpermitted discharges from CAFOs, EPA officials told us that they have to rely on other methods that are not necessarily all-inclusive, such as citizens' complaints, drive-by observations, aerial flyovers, and state water quality assessments that identify water bodies impaired by pollutants associated with CAFOs. According to EPA officials, these methods have helped the agency identify some CAFOs that may be discharging as well as targeting inspections to such CAFOs.

As a result of the *Waterkeeper* decision, EPA proposed a new rule in June 2006 requiring that (1) only CAFO operators that discharge, or propose to discharge, apply for a permit, (2) permitting authorities review CAFO nutrient management plans and incorporate the terms of these plans into the permits, and (3) permitting authorities provide the public with an opportunity to review and comment on the nutrient management plans. According to EPA officials, the final rule is currently being reviewed by the Office of Management and Budget, but at the time we issued our report, these officials were uncertain when this review would be completed and the final rule issued.

State water pollution control officials have expressed some concerns that EPA's new 2006 rule will place a greater administrative burden on states than the 2003 rule would have. In an August 2006 letter to EPA, the Association of State and Interstate Water Pollution Control Administrators noted that the "reactive" enforcement that EPA will now follow will require permitting authorities to significantly increase their enforcement efforts to achieve the level of environmental benefit that would have been provided by the 2003 rule. These officials believe that requiring EPA and the states to identify CAFOs that actually discharge pollutants into federally regulated water bodies will consume more resources than requiring all CAFOs to apply for a permit.

Moreover, although the *Waterkeeper* decision has affected EPA's ability to regulate CAFOs' water pollutant discharges, state officials we contacted

indicated that this decision has not had the same impact on their ability to regulate these operations. As table 1 shows, the impacts of the *Waterkeeper* decision have ranged from having little impact on state regulation to impairing state CAFO programs.

Table 1: State Officials' Views of the Impact of the Waterkeeper Decision on Their CAFO Programs

Impact of Waterkeeper	Number of states reporting impact
Waterkeeper had little or no impact	**16**
Reduced the number of CAFOs with permits	**15**
Impaired state program	**10**
Waiting for EPA to issue revised rule	**9**
Prompted state legislature to require permits for CAFOs	**1**

Source: GAO analysis of state officials' responses

Rapanos v. United States (*Rapanos*)

Although the *Rapanos* case arose in the context of a different permit program, the scope of EPA's pollutant discharge program originates in the same Clean Water Act definition that was at issue in the case. As a result, the decision has complicated the agency's enforcement of CAFO regulations. According to EPA enforcement officials, the agency will now be less likely to seek enforcement against a CAFO that it believes is discharging pollutants into a water body because it may be more difficult to prove that the water body is federally regulated. According to EPA officials, as a result of the *Rapanos* decision, EPA must spend more resources developing an enforcement case because the agency must gather proof that the CAFO has not only illegally discharged pollutants, but that those pollutants have entered federally regulated waters. The difficulties EPA has experienced were highlighted in a March 4, 2008, memorandum in which EPA's Assistant Administrator for Enforcement and Compliance Assurance stated that the *Rapanos* decision and national guidance issued by EPA to ensure "nationwide consistency, reliability, and predictability in their administration of the statute" in light of the Supreme Court's decision has resulted in significant adverse impacts to the clean water enforcement program. According to the memorandum, the Rapanos decision and guidance negatively affected approximately 500 enforcement cases, including as many as 187 cases involving NPDES permits.

In conclusion, Mr. Chairman, EPA has regulated CAFOs under the Clean Water Act for more than 30 years, and during this time it has amassed a significant body of knowledge about the pollutants discharged by animal feeding operations and the potential impacts of these pollutants on human health and the environment. Nevertheless, EPA still lacks comprehensive and reliable data on the number, location, and size of the operations that have been issued permits and the amounts of discharges they release. As a result, EPA has neither the information it needs to assess the extent to which CAFOs may be contributing to water pollution, nor the information it needs to ensure compliance with the Clean Water Act. More recently, EPA has also begun to address concerns about air pollutants that are emitted by animal feeding operations. The nationwide air emissions monitoring study, along with EPA's plans to develop air emissions estimating protocols, are important steps in providing much needed information on the amount of air pollutants emitted from animal feeding operations. However, questions about the sufficiency of the sites selected for the air emissions study and the quantity and quality of the data being collected could undermine EPA's efforts to develop air emissions protocols by 2011 as planned. A process-based model that more accurately predicts the total air emissions from an animal feeding operation is still needed. While EPA has indicated it intends to develop such a model, it has not yet established a strategy and timeline for this activity.

Mr. Chairman, this concludes my prepared testimony. I would be happy to respond to questions that you or Members of the Subcommittee may have.

Contact and Staff Acknowledgments

Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this testimony. For further information about this testimony, please contact Anu Mittal, Director, Natural Resources and Environment (202) 512-3841 or mittala@gao.gov.
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