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Air pollution by concentrated animal feeding operations

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ABSTRACT

With large concentrations of animals at individual facilities, animal production may be accompanied by environmental problems. One concern is whether adverse health effects may occur due to the emission of contaminants into the air. Concentrated animal feeding operations (CAFOs) emit ammonia, hydrogen sulfide, particulate matter, volatile organic compounds, and other hazardous air pollutants. Under current environmental regulations in the United States, few CAFO actions fall under the regulation of Clean Air Act. Therefore, the primary environmental statutes concerning air emissions from CAFOs are the Comprehensive Environmental Response, Compensation, and Liability Act and the Emergency Planning and Community Right-to-Know Act. Concerns about hardships on small animal producers led the federal Environmental Protection Agency to limit the application of the latter two laws to large CAFOs. States and CAFOs rushed to implement and comply with new regulations that became effective on 20 January 2009. This paper evaluates the justification for the regulation of CAFOs and evaluates whether the regulation of only large CAFOs is sufficient to safeguard public health.

Keywords: Air quality; Concentrated animal feeding operations; Legal enforcement; Regulation

1. Introduction

Changes in farming gave rise to a new form of animal production: large-scale farm operations. Large concentrated animal feeding operations (CAFOs) are able to achieve greater economies of scale but produce greater amounts of waste and byproducts that if not properly handled or disposed, may pose a threat to human and environmental health. Communities have become increasingly concerned with the negative externalities associated with CAFOs, which has resulted in citizen groups expressing greater desire for governmental action. These concerns are equally met by concerns from CAFO operators, many of which find costs associated with minimizing perceived negative effects of their farming operations as unwarranted and overly burdensome. Due to strong vested interests by numerous parties, federal and state legislatures in the United States navigate between interests of relevant parties. In this context, the U.S. Environmental Protection Agency (EPA) issued a final rule exempting the reporting of hazardous air releases from animal waste at farms [1]. The 2008 Reporting Exemption provides an exemption for administrative reporting required by the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the federal Emergency Planning and Community Right to Know Act (EPCRA) [2, 3].

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Public concerns over a comprehensive exemption have emerged wherein communities worried about their health sought access to emissions data from farming operations. In order to satisfy these concerns, the EPA saw fit to limit the exemption to small animal feeding operations, thereby requiring large CAFOs to report under EPCRA. Reporting requirements for CAFOs foster communities' right-to-know through the release of more data, which offers help in safeguarding public health. Determining the capability of reporting requirements to safeguard human health requires additional investigation into the effects air emissions from farms on neighboring communities' health and safeguards against violators.

2. Public health and regulation

2.1. Health concerns

The increase in the number of large CAFOs has been accompanied by concerns over the effects of CAFOs' air pollutants on public health. Releases of hazardous emissions into the air from animal production facilities occur as byproducts of the decomposition of animal waste in lagoons, barns, and fields [4]. Recent literature indicates that negative health effects are linked to exposure of large amounts of ammonia, hydrogen sulfide, particulate matter, volatile organic compounds, and other hazardous air pollutants from CAFO waste, although further research is needed to determine the extent [4]. Common health effects linked to air pollution include headaches, eye irritation, nausea, anger, depression, and other negative psychological responses [5]. Earlier findings of psychological responses [5] are supported by recent studies in which researchers [6] found odors impact emotions through imaging the brain. Other research, however, found no elevated levels of depression and anxiety among residents within two miles of swine operations compared to a random sample of rural residents [7].

The severity of health problems depends on weather, vicinity of a livestock operation, and the species of livestock. For instance, studies have found increased symptoms in areas surrounding swine operations. Wing and Wolf [8] compared responses of residents in rural North Carolina living within less than two miles of swine and cattle operations. The study revealed elevated symptoms of headache, runny nose, sore throat, coughing, diarrhea, and burning eyes among residents within the vicinity of swine operations in comparison to those residing in areas surrounding cattle operations and areas without livestock operations. Additionally, the study revealed a greater loss in quality of life, defined as "number of times residents could not open their window or go outside even in nice weather" [8].

The sparse literature reveals evidence of residents suffering deleterious health effects from neighboring CAFOs [9]. The three major studies [5, 7, 8] dealing with health effects and their relation to CAFOs, however, should be viewed with some scrutiny due to the limited sample size [10]. The limited sample size and limited time measurements hinder the ability to produce comprehensive information on the relationship of changing external conditions (seasonal and temperature variation) and air pollutants, as well as the casual relationship between concentration of air emissions by CAFOs and health effects on neighboring residents [11]. Additional investigation with equal focus given to technical issues, such as emissions responsible for health issues, and social science issues, such as "life norms and expectations among rural residents," may provide further insight on health issues accompanying air pollution from CAFOs [9, 11].

2.2. Prelude to the 2008 reporting exemption

In 2005, the EPA offered animal feeding operations an opportunity to sign an Animal Feeding Operations Air Compliance Agreement under which the operations would monitor their emissions and come into compliance with applicable laws [12]. The Animal Feeding Operations Air Compliance Agreement was a two-year voluntary data collection intended to produce data on air emissions while creating a means for managing air emissions from animal feeding operations. The Agreement was expected to identify scientifically-acceptable methodologies for determining hazardous emissions from CAFOs [13]. Under the Air Compliance Agreement, participating animal feeding operations were given "safe harbor" from lawsuits for failure to comply with EPCRA, CERCLA, and the Clean Air Act [14].

However, the oversight of animal producers under the Air Compliance Agreement did not resolve the issue of whether CAFOs needed to respond to the CERCLA and EPCRA reporting requirements. To respond to questions of reporting under these two laws, the EPA proposed a new reporting exemption [1]. In introducing a reporting exemption for hazardous air releases from animal waste, the EPA divided its support for promulgating its response into its lack of impetus and resources to respond to emissions, positive impacts of reducing reporting requirements, and state and local governments and the public's desire in requiring continuous reporting by CAFOs.

The EPA reported that it did not intend nor could it foresee itself responding to notifications of air emissions greater than reportable quantities at farms [1]. When determining if any action would be taken, the EPA considered comments from local and state officials.

The EPA found that various state and local governments were not going to respond. Some government officials, however, submitted comments arguing against the rule, but the EPA pointed out that none of these government officials denied they would not respond to air emissions [1]. The positive impacts of the rule primarily concerned reduction in economic costs. The EPA found the reporting exemption would reduce the time and costs farms allocate to reporting by 1,290,000 h and $60,800,000 over 10 years starting in 2009 [1].

2.3. The 2008 reporting exemption

Under the EPA's 2008 Reporting Exemption, air releases of hazardous substances from animal waste at farms are exempt from the reporting requirements of CERCLA and have a limited exemption under EPCRA [1]. The 2008 Reporting Exemption thereby distinguishes releases from animal waste at farms from other releases of hazardous substances. The definition of "hazardous substance" incorporates chemicals in more than 500,000 products and includes ammonia and hydrogen sulfide [15]. Moreover, the exemption only applies to air releases so that any release into waterways or soil equal to or greater than the reportable quantity of hazardous substances under CERCLA is not exempted.

In providing an administrative exemption under EPCRA, the EPA differentiated between small animal feeding operations and CAFOs. Only large CAFOs are required to report their releases under the emergency notification provisions found in Section 304 of EPCRA, with large CAFOs being defined as producers that house a species of animal in excess of the threshold established by the Clean Water Act's National Pollutant Discharge Elimination System regulations, reported in Table 1. Non-confined animals that graze and reside primarily in outside structures are exempted from reporting.

Under the exemption, animal production facilities that are large CAFOs estimate their peak releases over a 24-h period. Whenever a release exceeds a threshold delineated in the federal regulations, it needs to be reported [16]. The reportable quantities for ammonia and hydrogen sulfide releases that trigger administrative reporting are those above 18.3 tons/year [14].

Liability under EPCRA arises from a failure to report release of hazardous substances. For this reason, CAFOs face liability for not reporting and for under-estimating emissions of hazardous substances. In determining the amount of a given hazardous emission to report, large CAFOs are directed by the EPA to provide reports that reflect "good faith estimates." If a release of a hazardous substance is greater than the reportable quantity, a good faith estimate requires the CAFO to report the maximum amount released. The EPA has the authority to levy civil penalties against large CAFOs failing to report emissions of hazardous substances greater than or equal to the reportable quantity.

Table 1
Animal feeding operations (AFOs) that are considered to be large CAFOs.

700 mature dairy cows, whether milked or dry,
1,000 veal calves,
1,000 cattle other than mature dairy cows or veal calves,
2,500 swine each weighing 55 pounds or more,
10,000 swine each weighing less than 55 pounds,
500 horses,
10,000 sheep or lambs,
55,000 turkeys,
30,000 laying hens or broilers, if the AFO uses a liquid manure handling system,
125,000 chickens if the AFO uses other than a liquid manure handling system,
82,000 laying hens, if the AFO uses other than a liquid manure handling system,
30,000 ducks (if the AFO uses other than a liquid manure handling system), or
5,000 ducks (if the AFO uses a liquid manure handling system) [16].

With environmentalists and representatives of CAFOs challenging the rule in court, controversy surrounds this rule. Following the EPA's 2008 Reporting Exemption, Earthjustice and the National Pork Producers Council filed suit against the EPA in the U.S. Court of Appeals for the District of Columbia in order to review the EPA's 2008 Reporting Exemption [17]. Earthjustice seeks dismissal of the 2008 Reporting Exemption in light of scientific data suggesting possible threats to human health from emissions from animal waste at farms [17]. Conversely, the National Pork Producers Council seeks to enjoin the enforcement of any reporting requirements [18].

3. Discussion

Given the 2008 Reporting Exemption, does the public have adequate protection against health maladies that accompany emissions from animal feeding operations? Two issues must be addressed. First, because only large CAFOs are required to report, do unregulated feeding operations have emissions that adversely affect the public? Second, acknowledging that some CAFOs may not report, do the reporting requirements provide sufficient safeguards to protect the public against violators who fail to report their emissions?

The ability of a governmental regulation to have any bearing on public health requires the presupposition that the release of hazardous substances into the air by animal feeding operations can result in a negative health

effect on the surrounding community. This assumption finds justification in recent literature whereby evidence has demonstrated a correlation between deleterious health effects and proximity to CAFOs [4]. A study by the U.S. Government Accountability Office found that the EPA has yet to determine the human health effects of pollutants discharged into the air by animal waste from farms [19]. Without this information, it is unclear how the EPA calculated the effectiveness of safeguarding public health through reporting requirements that only apply to large CAFOs. Because no studies have been performed determining the effects of small animal feeding operations on community health, it is not clear that the 2008 Reporting Exemption provides sufficient protection of public health.

The second issue involves responses to CAFO operators who fail to report their emissions under EPCRA. While the regulating agency can initiate an action to require a violator to comply, such actions are unlikely. State regulatory agencies tend to be understaffed and lack the manpower to address most violations. This suggests that the citizen suit provisions offer the most likely avenue of redress for nonreporting. Citizen suit provisions were added to environmental statutes to induce agencies to do more in enforcing anti-pollution standards. Congress furnished many environmental statutes with citizen suit provisions in order to fill the void of under-enforcement by agencies due to resource limitations [20]. If agencies remain inert, citizen suits provide an alternative enforcement mechanism [21].

The reporting requirement for large CAFOs under EPCRA facilitates the safeguarding of public health by citizen groups. Under section 326 of EPCRA, private parties can seek injunctive and declaratory relief and civil penalties against violators [22]. Liability under EPCRA is grounded in failure to report [23]. Therefore, suit may be filed against CAFO operators for failure to submit relevant forms [22]. In addition, citizens can sue state and local governments for not making information available to the public [24]. If a citizen is intending to file suit against violating owners or operators, a 60-day notice must be provided to the state, EPA, and the alleged violator before commencing the litigation [22].

4. Conclusion

The U.S. EPA promulgated a 2008 Reporting Exemption obviating the reporting of hazardous substances released into the air from animal waste for farm operators under CERCLA and a limited exemption under EPCRA. The 2008 Reporting Exemption took effect on 20 January 2009 and eliminates reporting requirements for small animal producers. Facilities deemed to be large CAFOs remain subject to reporting requirements under EPCRA, but are exempted from reporting under CERCLA. In promulgating the 2008 Reporting Exemption, the EPA intended to reduce the burden of reporting for small operators for releases the EPA did not intend to respond to nor could foresee action being taken.

The preponderance of scientific literature concerning the public health surrounding farms is primarily focused on the effects associated with large CAFOs. Recent scientific literature has established a correlation between proximity to CAFOs and deleterious health effects. The literature indicates that variation in severity of negative health effects bears relationship with the species of animals in neighboring CAFOs. To establish a causal relationship between the negative health effects on neighboring communities and CAFOs, and to conclusively claim the 2008 Reporting Exemption safeguards public health, further studies are required. To address the full scope of safeguarding public health, investigation into the health effects associated with small animal feeding operations is also required.

Under the 2008 Reporting Exemption, few safeguards exist against violators who fail to report their emissions. When failing to report, violators can be subjected to citizen suits, but the ability of violators to defeat claims for litigation costs suggests that few suits will be filed. Agencies charged with the enforcement of the EPCRA reporting requirements are also unlikely to seek redress from violators. This may mean that inadequate incentives exist to encourage CAFO operators to report their emissions.

Given the lack of data relating health problems from the release of hazardous substances from CAFOs, the EPA's 2008 Reporting Exemption may have been untimely. Although the 2008 Reporting Exemption reduces the burden of paperwork for farmers, it must be weighed in light of the negative effects on neighboring communities' health and the communities' right-to-know. It is improbable that such an analysis was undertaken insofar as the EPA has yet to determine the health effects of air emissions on humans due to a shortage of air emissions data from farms [25]. More data needs to be collected and analyzed to determine the impacts of emissions from animal feeding operations on human health. Characteristics of CAFOs with emissions causing health problems can be identified so that these operations would be required to report their emissions.

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