



# C E N T E R F O R FOOD SAFETY

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Docket No. EPA-HQ-SFUND-2007-0469

To Whom It May Concern:

The Center for Food Safety (CFS) and its Cool Foods Campaign submits the following comments on the proposed rule, “CERCLA/EPCRA Administrative Reporting Exemption for Air Releases of Hazardous Substances From Animal Waste” under the Environmental Protection Agency. 72 Fed. Reg. 73700 (December 28, 2007).

CFS is a non-profit public interest and environmental advocacy membership organization established in 1997, working to protect human health and the environment from potentially harmful food production technologies and promoting sustainable alternatives. CFS combines multiple tools and strategies in pursuing its goals, including litigation and legal petitions for rulemaking, policy and research, as well as public education.

The Cool Foods Campaign of the Center for Food Safety is a public advocacy campaign that educates people about the connections between agriculture and food and their contribution to global warming. The Campaign has conducted extensive scientific data analyses of greenhouse gas emissions from all aspects of the U.S. food system including animal waste and animal production. The aim of the Campaign is to inform people about the impact of their food choices across the entire food system and create lifestyle changes to reduce global warming. Our campaign seeks solutions to the problem of global warming, and focuses on agricultural practices, including animal waste, that can reduce and reverse this trend.

We have a number of serious environmental and human health concerns about the emergency reporting exemption proposed by the EPA, as discussed in detail below.

## BACKGROUND

In the December 28, 2007 Federal Register, EPA announced a public comment period on a proposed rule to exempt the reporting of air releases of hazardous substances from animal waste.<sup>1</sup> Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 and the Emergency Planning and Community Right-to-Know Act (EPCRA), also known as Title III of the Superfund Amendments and Reauthorization Act, “any persons in charge of a vessel or an offshore or an onshore facility shall, as soon as he has knowledge of any release (other than a federally permitted release or application of a pesticide) of a hazardous substance from such vessel or facility in a quantity equal to or exceeding the reportable quantity determined by this part in any 24-hour period, immediately notify the National Response Center”.<sup>2</sup> Furthermore, under EPCRA section 304 (a) notification is required in the event of a release of an extremely hazardous substance regardless of whether it is subject to notification under CERCLA regulations and also if the substance is not extremely hazardous but subject to notifications of CERCLA.<sup>3</sup> It should be noted that the RQs per hazardous substance are for an **entire** facility per 24 hour period.

Hazardous and extremely hazardous substances subject to reporting under CERCLA/EPCRA and their reportable quantities (RQ) were determined by the EPA and published in 40 CFR 302.4 and 40 CFR 355 respectively.<sup>45</sup> The proposed rule acknowledges “although ammonia and hydrogen sulfide are the most recognized hazardous substances that are emitted from animal waste, there may also be some amounts of additional hazardous substances released.” These additional hazardous substances may include, but are not limited to: nitrous oxide and volatile organic compounds (VOCs) including organic sulfides, disulfides, C<sub>4</sub> to C<sub>7</sub> aldehydes, trimethylamines, C<sub>4</sub> amines, quinoline, dimethylpyrazine, C<sub>3</sub> to C<sub>6</sub> organic acids, along with lesser amounts of aromatic compounds and C<sub>4</sub> to C<sub>7</sub> alcohols, ketones and aliphatic hydrocarbons.<sup>6</sup> The proposed rule extends the administrative reporting exemption to include all hazardous substances emitted to the air from animal waste at farms.

The EPA seeks comment on the reporting exemption limited to releases of hazardous substances to the air from animal waste at farms and its potential to be extended to other facilities that also generate animal waste and definitions of the term, “animal waste” and “farm”.

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<sup>1</sup> 72 Fed. Reg. 72 No. 248 (December 28, 2007).

<sup>2</sup> 40 CFR Ch. 1 (7-1-02 Edition) section 302.6

<sup>3</sup> EPCRA section 304 a and b

<sup>4</sup> <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=4528f812f656cd5c350e3f0003be8a3a&rgn=div8&view=text&node=40:27.0.1.1.2.0.1.4&idno=40>

<sup>5</sup> 40 CFR 355 Appendix A and B <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=dc69c8609c0adf0209b3d4ae5d88f0a6&rgn=div5&view=text&node=40%3A27.0.1.1.11&idno=40#40:27.0.1.1.11.0.9.6.14>

<sup>6</sup> Id. at 1.

## CENTER FOR FOOD SAFETY COMMENTS

### *Summary*

According to the proposed rule, the EPA asserts that “this administrative reporting exemption is protective of human health and the environment and consistent with the Agency’s goal to reduce reporting burden where there would likely be no Federal, state or local emergency response to such release reports.” The EPA further notes that under this reporting the National Response Center receives on average, 34,000 notifications per year.<sup>7</sup>

Our comments will focus largely on the emissions, RQs and environmental and health concerns of ammonia (NH<sub>3</sub>) and hydrogen sulfide (H<sub>2</sub>S). As research shows, the RQs for ammonia and hydrogen are crucial for the health and safety of American farm workers, local communities and the environment. In some large scale farms and concentrated animal feeding operations (CAFOs), RQs are often exceeded and can be an important method for stopping large polluters and alerting communities of the potential health hazards associated with such releases. As well, variations in farm operations, weather events, climatic changes and manure management changes can unexpectedly create spikes in hazardous air emissions.

### **I. Reportable Quantities and Environmental Impacts from Emissions of Hazardous Substances Released by Air from Animal Waste**

Animal waste on farms is an extreme burden on the environment. Manure from just CAFOs is 3 times the volume of the nation’s human waste. “Animal manure is often held in liquid or solid form on the farm, awaiting disposal.”<sup>8</sup> Manure is often stored in “lagoons” or holding ponds that can contain up to 25 million gallons of manure and be as large as 20 acres and 15 feet deep.<sup>9</sup> <sup>10</sup> “During storage time the manure decomposes, and gaseous by-products are released.”<sup>11</sup> “Toxic gases such as hydrogen sulfide (H<sub>2</sub>S), carbon dioxide, ammonia and methane are present in every manure storage area.”<sup>12</sup> As manure and urine degrade they produce a complex mixture of particulate matter, bacteria, endotoxins, hundreds of volatile organic compounds and odors.<sup>13</sup> The EPA acknowledges that animal wastes on farms produce several hazardous substances that currently must be reported if they exceed their RQ. The Center for Food Safety and its Cool Foods Campaign are specifically concerned with RQs and emissions of ammonia from animal wastes which contribute to global warming and cause health and environmental problems, as well as hydrogen sulfide which adversely affects human health and the environment.

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<sup>7</sup> Id. at 1

<sup>8</sup> Park K. et al. Greenhouse gas emissions from stored liquid swine manure in a cold climate. *Atmospheric Environment* 40 (2006) 618-627.

<sup>9</sup> Marvin D. Factory Farms Cause Pollution Increases, *Johns Hopkins University Newsletter* 2004.

<sup>10</sup> Schlosser, Eric and Charles Wilson, *Chew On This* (New York, New York: Houghton Mifflin Company, 2006), 166.

<sup>11</sup> Id. at 8.

<sup>12</sup> Cyr, Dawna and Steven Johnson. Barn and Manure Storage Safety Bulletin. University of Maine Cooperative Extension. <http://www.umext.maine.edu/onlinepubs/htmpubs/2304.htm>

<sup>13</sup> Osterberg, D. et al. Addressing Externalities From Swine Production to reduce Public Health and Environmental Impacts, *American Journal of Public Health* 94 (2004) 1703- 1708.

## *Ammonia*

The impact of ammonia on the environment and global warming is two-fold. Ammonia emissions can be converted to nitrous oxide and it is estimated that 1% of deposited nitrogen emits as nitrous oxide.<sup>14</sup> “Considering the amount of ammonia emissions from manure, the effect on global warming should be examined.” Once emitted, ammonia can be rapidly converted to the aerosol ammonium ( $\text{NH}_4^+$ ) which “contributes to ecosystem fertilization, acidification, and eutrophication. After  $\text{NH}_3$  is emitted to the atmosphere, each nitrogen atom can participate in a sequence of effects, known as the nitrogen cascade in which a molecule of  $\text{NH}_3$  can, in sequence, impact atmospheric visibility, soil acidity, forest productivity, terrestrial ecosystem biodiversity, stream acidity and coastal productivity.”<sup>1516</sup> These processes increase methane emissions<sup>17</sup> and decrease carbon sequestration through photosynthesis,<sup>18</sup> thereby exacerbating climate change

Animal husbandry and livestock operations result in considerable emissions of ammonia.<sup>19</sup> Globally, animal farming systems emit about 50% of total ammonia emissions from terrestrial systems. Of this, emissions from animal waste accounted for about 50% of the total.<sup>20</sup> Stored slurry (manure) is also a significant source of anthropogenic ammonia.<sup>21</sup> Additionally, urea in urine can be hydrolyzed into ammonia by enzymes present in feces. Ammonia also contributes heavily to localized odor.<sup>22</sup> Under CERCLA, ammonia has a RQ of 100 pounds per facility per 24-hour period.<sup>23</sup> As discussed below this quantity is likely to be frequently exceeded in farms and CAFOs throughout the country on a daily basis and in certain events.

## *Hydrogen Sulfide*

Hydrogen sulfide ( $\text{H}_2\text{S}$ ) “is a by-product of manure decomposition under “anaerobic” conditions, which means in the absence of oxygen.”<sup>24</sup> “Lagoons release tons of hydrogen

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<sup>14</sup> Houghton J.T., et al. IPCC Guidelines for National Greenhouse Gas Inventories. *IPCC/OECS/IEA 1997*.

<sup>15</sup> Amon, B. et al. Methane, nitrous oxide and ammonia emissions during storage and after application of dairy cattle slurry and influence of slurry treatment, *Agriculture, Ecosystems and Environment* 112 (2006) 153-162.

<sup>16</sup> Ad Hoc Committee on Air Emissions from Animal Feeding Operations. Air Emissions from Animal Feeding Operations: Current Knowledge, Future Need. *National Academies* 2003. p. 52 online at <http://site.ebrary.com/lib/columbia/Doc?id+10032352&ppg=74>

<sup>17</sup> Giani, Luise; Ahrensfield, Elke. (2002). Pedobiochemical indicators for eutrophication and the development of “black spots” in tidal flat soils on the North Sea coast. *Journal of Plant Nutrition and Soil Science*, 165: 537-543.

<sup>18</sup> Lal, R.; Stewart, B.A. (1990). Soil Degradation. New York: Springer-Verlag. In Pimentel, David; Pimentel, Marcia. (2008). Food, Energy, and Society: Third Edition. CRC Press: Boca Raton, FL.

<sup>19</sup> Id. at 15.

<sup>20</sup> Id. At 16

<sup>21</sup> Sommer, SG., et al. Ammonia volatilization during storage of cattle and pig slurry: effect of surface cover. *Journal of Agricultural Science* 121(1993) 63-71.

<sup>22</sup> Predicala, B. et al, Control of  $\text{H}_2\text{S}$  emission from swine manure using Na-nitrate and Na-molybdate. *Journal of Hazardous Materials* Online October 2007

<sup>23</sup> Id. at 2.

<sup>24</sup> Hallman E., et al. Hydrogen Sulfide in manure Handling Systems: Health and Safety Issues. *Cornell University Manure Management Program*. June 2006 Online at:

sulfide into the air”<sup>25</sup>...making emissions on a regional basis of particular concern since the concentration of farms and CAFOs in a high proportion in certain areas could place a significant burden on air quality. H<sub>2</sub>S is also highly odorous and may present additional air quality concerns with regards to community well-being and comfort.<sup>26</sup> “In addition to being an odor nuisance, H<sub>2</sub>S is corrosive and toxic...potentially hazardous H<sub>2</sub>S levels can be generated in swine confinement building during the pulling of manure pit plugs, manure agitation and pump out, operation and maintenance of manure handling equipment and drainage lines, and power washing.”<sup>27</sup>

### *Nitrogen Oxide*

Nitric oxide (NO) emissions can be directly attributable to livestock and manure, as well as other sources.<sup>28</sup> Nitrogen dioxide (NO<sub>2</sub>) “is derived from NO by photochemical reaction and is a precursor of nitric acid...nitric oxide and NO<sub>2</sub> play a key role in atmospheric chemistry.” NO is produced during microbial processes after the application of manure to agricultural fields, thus the input of organic waste (i.e. manure) to the agricultural soil would be a NO source.<sup>29</sup> Studies have also shown that manure is an important source of NO<sup>30</sup> and that “a substantial fraction of manure nitrogen applied to soils as fertilizer can be emitted as NO.”<sup>31</sup> Within the atmosphere, both NO and NO<sub>2</sub> are jointly referred to as NO<sub>x</sub> and are an important precursor in ozone (a greenhouse gas) production and a variety of other atmospheric compounds.<sup>32</sup> Under CERCLA, nitrogen oxides (NO, NO<sub>2</sub>) have a RQ of 10 pounds per facility per 24-hour period.<sup>33</sup>

## **II. Current Estimation of Ammonia Emissions and Instances of RQ Violations**

Estimations of the emission rates of ammonia from animal waste vary depending on a variety of factors including animal type, housing unit and slurry storage.<sup>34</sup> <sup>35</sup> Numerous studies have researched the various conditions and the resulting ammonia emissions. The RQ for ammonia is set at 100 pounds per day per facility. It is noteworthy to consider the extreme fluctuations that have been noted in research- an indicator that there are certainly instances when ammonia emissions may exceed RQs. “Within one study there is as much as

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<http://www.manuremanagement.cornell.edu/Docs/H2S%20Safety%20fact%20sheet%20FINAL%204-30-07.pdf>

<sup>25</sup> Id at 10, Pg. 167

<sup>26</sup> Id. at 16

<sup>27</sup> Id. at 22

<sup>28</sup> Id. At 16

<sup>29</sup> Williams, E.J. et al. NO<sub>x</sub> and N<sub>2</sub>O emissions from soil. *Global Biogeochem. Cycles* 6 (1992) 351–388.

<sup>30</sup> Akiyama, H., et al. Nitrous oxide, nitric oxide, and nitrogen dioxide fluxes from soils after manure and urea application. *Journal of Environmental Quality* 23 (2003) 423-431.

<sup>31</sup> Id at 16

<sup>32</sup> Id.

<sup>33</sup> Id. at 2.

<sup>34</sup> Amon, B. et al. Methane, nitrous oxide and ammonia emissions during storage and after application of dairy cattle slurry and influence of slurry treatment, *Agriculture, Ecosystems and Environment* 112 (2006) 153-162.

<sup>35</sup> Hoff, S., et al. Emissions and Community Exposures from CAFOs- Chapter 4. *Iowa Concentrated Animal Feeding Operation Air Quality Study- University of Iowa*. Published online at <http://www.public-health.uiowa.edu/ehsrc/CAFOstudy.htm>

a 12.5-fold variation in measured ammonia flux during one summer season.”<sup>36</sup> As the following research indicates, this number is being violated frequently on large scale CAFO farms and is creating adverse environmental and human health effects.

### *Swine*

Ammonia emissions from swine depend on the type of manure storage area and the type of housing unit. Aarnink et al. (1995) concluded that nursery pigs produced between 19 and 33g of ammonia per pig<sup>37</sup> per day and finishing pigs produced an average of 42-43 g of ammonia per pig per day within housing units.<sup>38</sup> Demmers et al. (1999) found results much higher in ventilated swine building where swine produced an average emission rate of 160g (.35 pounds) of ammonia per swine per day.<sup>39</sup> Hinz and Linke (1998) found that emission rates varied and produced up to 210g (.46 pounds) of ammonia per hour in housing units.<sup>40</sup>

According to the EPA, a large CAFO may contain more than 10,000 swine.<sup>41</sup> Under this type of confinement, where a swine is producing on average .35 pounds of ammonia from waste per day in some situations, this type of facility would be producing 3,500 pounds of ammonia per day – a clear and blatant violation of the RQ for the facility. In such a case, the RQs not only serve the purpose to alert authorities of such releases and allow them to take measures to mitigate such pollution, but will also alert the public for potential health impacts.

Emission rates from swine manure storage produced equally varied results based largely on season, temperature, dilution and cover.<sup>42,43</sup> Ammonia flux from manure pits depended additionally on the type of storage facility. Zahn et al. (2000) found that earthen, concrete-lined, steel tanks produced an average of 144 g (.32 pounds) of ammonia/m<sup>2</sup> per day, whereas lagoons without photosynthetic blooms produced 94g (.21 pounds) of ammonia/m<sup>2</sup> per day. Manure lagoons can be massive- some may contain as much as 25 million gallons of manure.<sup>44</sup> With an RQ of 100 pounds per facility per day and manure lagoons this large, there is a strong potential for violations.

### *Cattle and Dairy*

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<sup>36</sup> Id. at 16

<sup>37</sup> Per pig calculations are based on 500kg weight per animal

<sup>38</sup> Aarnink, AJA., et al. Ammonia emission patterns during the growing periods of pigs house on partially slatted floors. *Journal of Agricultural Engng. Res.* 62 (1995) 105-116.

<sup>39</sup> Demmers, TGM., et al. Ammonia emissions from two mechanically ventilated UK livestock buildings. *Atmospheric Environment* 33 (1999) 217-227.

<sup>40</sup> Hinz, T et al. A comprehensive experimental study of aerial pollutants in and emissions from livestock buildings. Part 2: Results. *Journal of Agricultural Engng. Res.* 70 (1998) 119-129.

<sup>41</sup> Environmental Protection Agency. Regulatory Definitions of Large CAFOs, Medium CAFO and Small CAFOs. Online at [http://www.epa.gov/npdes/pubs/sector\\_table.pdf](http://www.epa.gov/npdes/pubs/sector_table.pdf)

<sup>42</sup> Aneja, VP., et al. Measurement and analysis of atmospheric ammonia emissions from anaerobic lagoons. *Atmospheric Environment* 35 (2001) 1949-1958.

<sup>43</sup> Id. 21

<sup>44</sup> Id. at 9

Emission rates of ammonia in housing units for cattle and dairy, like swine, are extremely variable. Ventilation rates, bedding materials and flooring systems played a significant factor in the amount of emissions produced.<sup>454647</sup> Average rates vary from as low as 11.5g (.03 pounds) of ammonia per cattle<sup>48</sup> per day<sup>49</sup> to 51.8g (.11 pounds) of ammonia per cattle per day.<sup>50</sup>

According to the EPA, a CAFO may contain more than 1,000 cattle. Under this type of confinement where cattle may produce *on average* up to .11 pounds of ammonia per cattle per day, a facility with 1,000 cattle would produce 110 pounds of ammonia per day. This is in many cases a gross underestimate – in Texas, for example, nearly half of the permitted beef cattle CAFOs hold more than 16,000 animals.<sup>51</sup> These massive facilities would thus be producing more than 1,760 pounds of ammonia per day in some instances – a violation of the RQ by more than 17 times.

### *Poultry*

Ammonia emissions from poultry in housing units were dependent on season and ventilation systems. Average ammonia levels as high as 300g (.66 pounds) of NH<sub>3</sub> per AU<sup>52</sup> per day have been recorded. For broiler chickens, average levels have been recorded at 216g (.48 pounds) NO<sub>2</sub> AU per day.<sup>53</sup> According to the EPA, CAFOs may contain more than 82,000 laying chickens. In such a facility, ammonia emissions would be around 147 pounds per day. This indicates a clear defiance of the RQ established for ammonia. Such infractions need to be reported since they are causing environmental harm and endangering farm workers and neighbors.

### **III. Current Estimation of Hydrogen Sulfide Emissions and Instances of RQ Violations**

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<sup>45</sup> Groot Koerkamp, et al. Concentrations and emissions of ammonia in livestock building in northern Europe. *Journal of Agricultural Engng Res*, 70 (1998) 79-95.

<sup>46</sup> Kroodsma, W., et al. Ammonia emission and its reduction from cubicle houses by flushing. *Livestock Production science*, 35 (1993) 293-302.

<sup>47</sup> Jeppsson, KH. Volatilization of ammonia in deep-litter systems with different bedding materials for young cattle. *Journal of Agriculturl Engng. Res.* 73 (1999) 49-57.

<sup>48</sup> Per cattle calculations are based on 500kg weight per cattle

<sup>49</sup> Id at 45

<sup>50</sup> Swierstra, D., et al. grooved floor system for cattle house: Ammonia emission reduction and good slip resistance. *App Eng in Agric.* 17 (2001) 85-90.

<sup>51</sup> Stubbs, K., et al. CAFOs Feed a Growing Problem- Concentrated animal feeding operations.

*Endangered Species Bulletin*. Jan, 1999. Online at:

[http://findarticles.com/p/articles/mi\\_m0ASV/is\\_1\\_24/ai\\_54466913](http://findarticles.com/p/articles/mi_m0ASV/is_1_24/ai_54466913)

<sup>52</sup> AU= Animal Unit=500kg. For our calculations, an average broiler chicken weighs 3 pounds (<http://en.wikipedia.org/wiki/Chicken>). Therefore 1AU= 367 chickens

<sup>53</sup> Wathes, CM., et al. Concentrations and emission rates of aerial ammonia, nitrous oxide, methane, carbon dioxide, dust and endotoxin in UK broiler and layer houses. *British Poultry Science* 38 (1997) 14-28.

Estimations of the emission rates of hydrogen sulfide from animal waste vary depending on a variety of factors including animal type, housing unit and slurry storage.<sup>54 55</sup> “Hydrogen sulfide is a by-product of manure decomposition under anaerobic conditions...manure storage pits, reception pits, and above-grade manure storage tanks are examples of manure handling systems in which hydrogen sulfide may be produced and accumulate.”<sup>56</sup> Numerous studies have researched the various conditions and the resulting hydrogen sulfide emissions. The RQ for hydrogen sulfide is set at 100 pounds per day per facility. It is noteworthy to consider the extreme fluctuations that have been noted in research - an indicator that there are certainly instances when hydrogen sulfide emissions may exceed RQs. As the following research indicates, this number is being violated frequently on large scale CAFO farms and is creating adverse environmental and health effects.

### *Swine*

Variations in hydrogen sulfide emissions from swine were variable based on housing systems and facilities, number and type of animal in confinement, and ventilation. Average daily emission rates within housing units ranged between 1.25g of hydrogen sulfide per pig<sup>57</sup> per day to 160 g (.35 pounds) hydrogen sulfide per pig per day.<sup>5859</sup> Under EPA provisions that allow CAFOs to store more than 10,000 swine in a single facility<sup>60</sup>, it is possible that more than 3,500 pounds of ammonia are emitted per day- clearly over legal limit.

Additionally, hydrogen sulfide is produced at manure storage areas. Studies that have examined the amount of hydrogen sulfide emitted with manure storage recognize that different storage techniques can cause variations in emissions.<sup>61</sup> One study found that average daily emissions were 66.6 g (.15 pounds) H<sub>2</sub>S/m<sup>2</sup>-day.<sup>62</sup>

### *Cattle and Dairy*

One study indicated that in naturally ventilated dairy housing units, internal concentrations of hydrogen sulfide created emission rates that averaged about .26g of H<sub>2</sub>S/m<sup>2</sup>-day. Depending on the size and number of cattle within a facility, as well as additional fluctuations in emissions, this could add up to a significant quantity of H<sub>2</sub>S<sup>63</sup>

### *Poultry*

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<sup>54</sup> Ni, JQ., et al. Ammonia, hydrogen sulfide and carbon dioxide release from pig manure in under-floor deep pits. *Journal Agric. Engng Res.* 77 (2000) 53-56.

<sup>55</sup> Zhu J., et al. Daily variations in odor and gas emissions from animal facilities. *App Eng in Agric.* 16 (2000) 153-158.

<sup>56</sup> Id at 24

<sup>57</sup> Id. at 48.

<sup>58</sup> Id. at 66 (zi)

<sup>59</sup> Id. at 55

<sup>60</sup> Id. at 52. (wathes)

<sup>61</sup> Zhan, JA., et al. Functional classification of swine manure management systems based on effluent and gas emission characteristics. *Journal of environmental Quality* 30 (2001) 635-647.

<sup>62</sup> Hobbs, PJ., et al. Production and emission of odours and gases from ageing pig waste. *Journal Agric. Engng Res.* 72 (1999) 291-298.

<sup>63</sup> Id. at 55

Emissions generated from a ventilated broiler house that used litter bedding have been studied. During monitoring, the internal concentrations of hydrogen sulfide varied with an average emission rate being about 3.3g (.01 pounds) H<sub>2</sub>S/ AU<sup>64</sup>- day. Depending on the size and number of poultry within a facility, as well as additional fluctuations in emissions, this could add up to a significant and potentially reportable quantity of H<sub>2</sub>S.<sup>65</sup>

#### **IV. Health Impacts from Hazardous Substances Released by the Air from Animal Wastes**

According to the EPA, CERCLA provided “broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment.”<sup>66</sup> By designating a list of hazardous and extremely hazardous substances and assigning RQ values, the EPA has clearly recognized the potential imminent danger of such releases. As we have already established, the EPA notes that ammonia, hydrogen sulfide and a myriad of other hazardous substances are present in animal manure on farms.<sup>67</sup> The EPA acknowledges that CAFOs, “can have a negative impact on nearby residents, particularly with respect to objectionable odors and other nuisance problems that can affect their quality of life. EPA also recognizes that concerns have been raised recently regarding the possible health impacts from [C] AFO emissions.”<sup>68</sup>

The dangers of air releases from hazardous materials from animal waste are diverse and far-reaching:

“During decomposition, noxious levels of gases, such as hydrogen sulfide and ammonia, are emitted, putting workers and nearby residents at risk of developing a number of acute and chronic illnesses. Studies have shown that those who lives near factory farms are more likely to suffer from a range of medical problems, including diarrhea, sore throat, cough, chest tightness, nasal congestion, heart palpitations, shortness of breath, sudden fatigue, headaches, nausea, sudden loss of consciousness, comas, seizures, and, ultimately, even death.”<sup>69</sup>

Despite this, the EPA wishes to deregulate the reporting of such emissions because, “The Agency believes that a federal response to such notifications is impractical and unlikely.”<sup>70</sup> Such oversight is a gross neglect on human health and will expose unknowing farm workers, families and communities to dangerous and deadly levels of emissions.

The National Institute for Occupational Safety and Health (NIOSH) has recognized the dangers of animal waste emissions and has recommended strict safety measures to limit

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<sup>64</sup> AU= Animal Unit=500kg. For our calculations, an average broiler chicken weighs 3 pounds (<http://en.wikipedia.org/wiki/Chicken>). Therefore 1AU= 367 chickens

<sup>65</sup> Id. at 55

<sup>66</sup> CERCLA overview <http://www.epa.gov/superfund/policy/cercla.htm>

<sup>67</sup> 72 Fed. Reg. 72 No. 248 (December 28, 2007).

<sup>68</sup> 70 Fed. Reg. 4958, 4959 (Jan. 31, 2005)

<sup>69</sup> Marks Dairy Farm manure Spill Threatens Environment and Public Health *Humane Society of the United States* August 24, 2005 Online at:

[http://www.hsus.org/farm/news/ournews/marks\\_dairy\\_farm\\_manure\\_spill.html](http://www.hsus.org/farm/news/ournews/marks_dairy_farm_manure_spill.html)

<sup>70</sup> 72 Fed. Reg. 72 No. 248 (December 28, 2007).

exposure to manure. It notes, “Manure pits produce toxic atmospheres which can overcome a worker in a very short period of time, and often result in multiple fatalities. Deaths in manure pits can result either from oxygen deficiency or from the direct toxic effects.” NIOSH reported 13 deaths between 1992 and 1997 from work associated in a manure pit.<sup>71</sup> One study further noted that “respiratory illness is the most recognized occupational risk” for workers in a CAFO.<sup>72</sup>

Furthermore, “when pits are agitated for pumping, some or all of these gases are rapidly released from the manure and may reach toxic levels or displace oxygen, increasing the risk to humans and livestock.”<sup>73</sup> RQs serve a vital purpose by reporting such deadly fluctuations that may occur throughout the year.

The health risks associated with air pollution from CAFOs are not solely limited to farm workers. Studies have demonstrated that as CAFOs are established in certain areas, corresponding health problems increase in local communities and symptoms are consistent with those found in workers.<sup>74</sup> North Carolina residents within a close proximity to a 6,000 swine operation reported respiratory, intestinal and other symptoms significantly more so than people from communities who did not live near such facilities. Other North Carolina residents living close to CAFOs for an average of five years reported significantly higher levels of tension, depression, anger, fatigue and confusion than unexposed groups.<sup>75</sup> Similar respiratory symptoms occurred in residents in Iowa who lived close to a 4,000 sow operation. Neighbors reported increased sputum, chest tightness, shortness of breath and wheezing significantly more so than people not living near the facility.<sup>76</sup> Significant respiratory problems also occurred in residents of Milford, Utah- the home of one of the nation’s largest industrial hog facilities. Hospital discharges for respiratory and diarrheal illnesses in Milford tripled and quadrupled, respectively, over the subsequent five years after the facility was built.<sup>77</sup>

#### *Health risks associated with ammonia*

Ammonia is a strong respiratory irritant with severe odors and irritant properties. It is carried deep into lungs where it irritates tissues even at low concentrations. Additionally, ammonia damages and impedes lung cilia from clearing dust particles which exasperates irritation.<sup>78</sup> At moderate levels, ammonia can irritate eyes and at high concentrations it can

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<sup>71</sup> National Institute for Occupational Safety and Health (NIOSH) Recommendations to the U.S. Department of Labor for Changes to hazardous order. Center for Disease Control and NIOSH. May 2002, 86-88. Online at: <http://www.cdc.gov/niosh/docs/nioshrecsdolhaz/pdfs/dol-recomm.pdf>

<sup>72</sup> Osterberg.

<sup>73</sup> Concentrated Animal Feeding Operations: Health Risks from Air Pollution *Institute for Agriculture and Trade policy* Online at: <http://www.healthobservatory.org/library.cfm?refID=37388>

<sup>74</sup> Id.

<sup>75</sup> Schiffman SS et al. Potential health effects of odor from animal operations, wastewater treatment, and recycling of byproducts. *Journal of Agromedicine* 7 (2000) 7-81.

<sup>76</sup> Thu K. et al. A control study of the physical and mental health of residents living near a large scale swine operation. *Journal of Agricultural Safety and Health* 3 (1997) 13-26.

<sup>77</sup> Keller KH and Ball RW. A retrospective study of diarrheal and respiratory illness incidence rates in milford, Utah 1992-1998. *Bureau of epidemiology: Utah Department of Health*. January 2000

<sup>78</sup> Id.

cause ulceration to the eyes.<sup>79</sup> The average concentration of ammonia reported at hazardous waste sites ranges from 1 to 1,000 ppm in soil samples and up to 16 ppm in water samples.<sup>80</sup> Despite this, the generally agreed to maximum acceptable level for ammonia is 25ppm- a level that is commonly reached in CAFOs during the winter months, “even under normal winter ventilation rates.”<sup>81</sup> At levels 2,500-6,000 parts per million ammonia causes pulmonary edema and is fatal.<sup>82</sup>

### *Hydrogen Sulfide*

Hydrogen sulfide is by far the most dangerous gas found in animal feeding operations.<sup>83</sup> It is responsible for most manure-related deaths of animals and people<sup>84</sup> and has the ability to kill in a matter of seconds.<sup>85</sup> “Hydrogen sulfide overexposure can be more serious than exposure to ammonia, since it affects the body’s uptake of oxygen by poisoning the blood forming tissue and acts as a chemical asphyxiant, preventing the proper transport and use of oxygen in the body’s metabolism.”<sup>86</sup> At low levels hydrogen sulfide causes eye and lung irritations, which progress to headaches, nausea and dizziness at increased concentrations.<sup>87</sup>

The toxic substance has a distinct rotten egg smell that is recognizable at first but “does not give adequate warning of hazardous concentrations because olfactory fatigue (the inability of smell H<sub>2</sub>S) occurs after exposure to concentrations in the range of 100 to 150ppm.”<sup>88</sup> At high levels hydrogen sulfide paralyzes nerve cells in the nose and prevents a person from smelling the gas. Workers who are used to the smell may be unable to recognize when they have been breathing hydrogen sulfide for an extended and life threatening amount of time.<sup>89</sup> This may also cause workers to enter an area with high levels of hydrogen sulfide to assist a co-worker who has been injured. “Manure gas accidents usually cause more than one death or injury because co-workers or relatives attempting a rescue are themselves overcome by the gas.”<sup>90</sup>

While hydrogen sulfide is clearly an occupational hazard, not all of those who have been killed in manure pit accidents were farm workers. In Minnesota between the years 1984 and 1996, 25% of manure pit related deaths were children under the age of 6. Comparatively,

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<sup>79</sup> Manure Gas Dangers *Farm Safety Association* Online at <http://www.cdc.gov/nasd/docs/d001601-d001700/d001616/d001616.pdf>

<sup>80</sup> Public Health Statement for Ammonia. *Department of Health and Human Services, Agency for Toxic Substances and Disease Registry* September 2004. Online at: <http://www.atsdr.cdc.gov/toxprofiles/phs126.html>

<sup>81</sup> Lorimor, J., et al. Manure Storage Poses Invisible Risks *Iowa State University- National Ag Safety Database* Online at : <http://www.cdc.gov/nasd/docs/d001001-d001100/d001069/d001069.html>

<sup>82</sup> Final Technical work Paper for Human Health Issues *Animal Agriculture GEIS- Minnesota Planning*. Online at [http://www.eqb.state.mn.us/geis/TWP\\_HumanHealth.pdf](http://www.eqb.state.mn.us/geis/TWP_HumanHealth.pdf)

<sup>83</sup> Id. at 79

<sup>84</sup> Id. at 81.

<sup>85</sup> Id. at 24

<sup>86</sup> Id at 82

<sup>87</sup> Id. at 79

<sup>88</sup> Id. at 82

<sup>89</sup> Id. at 79

<sup>90</sup> Farm Safety Program and Publications- Hydrogen Sulfide. *The Government of Saskatchewan* Online at <http://www.labour.gov.sk.ca/Default.aspx?DN=9f6b2cbc-ca79-4441-8c4f-735e7fb4a8e8>

about 18% of farm-related deaths occurred in children under the age of 16 between the years 1990 and 1999 in Minnesota- “so a disproportionate number of preventable non-occupational fatalities occurred due to manure pits”.<sup>91</sup>

Hydrogen sulfide is heavier than air and will tend to settle in lower areas and can remain in high concentrations even after ventilation.<sup>92,93</sup> When manure is agitated, stirred or moved the amount of hydrogen sulfide produced can kill people and animals within minutes at high concentrations.<sup>94</sup> “Life threatening conditions are unpredictable and may occur in areas that were entered many times previously without incident.”<sup>95</sup> Concentrations as low as 1,000 ppm can result in death and maximum allowable concentrations are 10 ppm. <sup>96</sup> RQs will continue to ensure that high levels of hydrogen sulfide will be reported and proper ventilation, safety measures and clean up will be undertaken to prevent death and injury.

#### *Other Greenhouse Gas Emissions from CAFOs*

Finally, greenhouse gases (GHG) released by CAFOs such as methane and nitrous oxide should also be considered hazardous substances under CERCLA. Methane and nitrous oxide are produced from livestock and animal production and contribute heavily to global warming.<sup>97</sup> Globally, around 50% of the total anthropogenic emissions from nitrous oxide are from agriculture and animal farming systems, including manure and urine. Nitrous oxide has a global warming potential 296 times that of carbon dioxide. Methane contributions from agriculture are the largest anthropogenic source with livestock production being one of the largest contributors. Methane has a global warming potential 23 times that of carbon dioxide.<sup>98</sup>

CERCLA defines “hazardous substance” to include, *inter alia*, “any hazardous air pollutant listed under 112 of the Clean Air Act [42 U.S.C. § 7412].”<sup>99</sup> While greenhouse gases have not yet been so listed, the U.S. Supreme Court ruled in 2007 that GHG were air pollutants under the CAA and required EPA to make a now-pending endangerment finding under the CAA for GHGs.<sup>100</sup> This is still further evidence of the impacts of these emissions and further reason why the agency should not adopt the proposed exemption.

## **V. Events that May Release RQ Levels of Hazardous Substances**

Research has shown that RQ levels may be exceeded frequently within large CAFO units containing thousands of animals. These violations should be considered illegal releases of

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<sup>91</sup> Id. at 82

<sup>92</sup> Id. at 79

<sup>93</sup> Id. at 81

<sup>94</sup> Id. at 12

<sup>95</sup> Id. at 24

<sup>96</sup> Id. at 81

<sup>97</sup> Id. at 15.

<sup>98</sup> Id. at 16.

<sup>99</sup> 42 U.S.C. § 9601(14).

<sup>100</sup> Mass. v. EPA, 127 S.Ct. 1438 (2007).

hazardous substances. In addition to these regular occurrences, numerous events may cause an air release of hazardous substances from animal waste on farms.

Differences in temperature, rainfall frequency and intensity, wind speed, topography and soils have a huge impact on the amount of air emissions released from farms. Emission rates between the winter and the summer may change significantly as manure decomposes differently at various heat levels.<sup>101</sup> According to NIOSH, “The warmer, more humid weather that occurs during the summer months accelerates the production and accumulation of hazardous gases.”<sup>102</sup> Significant rainfall or precipitation may cause manure pits and lagoons to flood or begin to leak. Hurricanes have historically caused manure lagoons to burst or leak. In 2006, Hurricane Ernesto caused many lagoons in the south to burst or leak releasing not only untreated animal waste into local waterways but massive amounts of hazardous substances to the air.<sup>103</sup> In 1999, North Carolina was struck by hurricanes Dennis and Floyd within the same week. Intense flooding causes several lagoons to break which created widespread flooding and because of agitation, likely released significant amounts of hazardous substances to the air.<sup>104</sup>

Additional on farm activities can also create changes in emissions. As we have demonstrated, there is extreme variability in daily emission rates from animals on farms depending on animal type, housing unit and slurry storage.<sup>105106</sup> The EPA recognizes that “other event-driven processes that can increase emissions include lagoon turnover, flush cycles for housing units, manure scraping at feedlots, and land application of lagoon liquids.”<sup>107</sup> Any type of manure agitation or pump out, operation and maintenance of manure handling equipment and drainage lines and power washing can additionally create the potential for hazardous releases<sup>108</sup> as gases are rapidly released and can displace oxygen.<sup>109</sup> Considering the number of deaths reported from manure management issues, the EPA should recognize the extreme importance of maintaining RQ values and reporting releases to air from hazardous substances like hydrogen sulfide and ammonia.<sup>110111</sup> Such events that cause a RQ violation need to be monitored and reported to ensure the health and safety of all involved parties, animals, communities and the environment.

## **VI. Conclusions and Recommendations**

In conclusion:

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<sup>101</sup> Id. at 16

<sup>102</sup> Id. at 69

<sup>103</sup> Sustainable Table. September 8 2006 News Stories. Online at:

<http://sustainabletable.org/blog/?m=200609&paged=2>

<sup>104</sup> Id. at 69

<sup>105</sup> Id. at 34

<sup>106</sup> Id. at 35

<sup>107</sup> Id. at 16

<sup>108</sup> Id. at 24

<sup>109</sup> Id. at 82

<sup>110</sup> Id. at 82

<sup>111</sup> Id. at 69

- The EPA's proposed rule to exempt air releases of hazardous substances from animal waste is neglectful of its statutory responsibility to protect the public health and environment.

Ammonia and hydrogen sulfide are toxic gases present in animal wastes<sup>112</sup> that need to be treated as the classified hazardous wastes that they are. By exempting the reporting of air releases of hazardous substances from animal waste at farms the EPA will not be fulfilling its statutory mandate to protect human health and the environment. Instead, vast amounts of toxic gases will be released without proper reporting or cleanup and future mitigation. This exemption will degrade the atmosphere, adversely and disproportionately affect the health of farm workers and local communities, and allow large scale polluters to continue to wreak havoc on the environment and human health without any consequences. CERCLA was enacted to provide a framework for cleanup of hazardous wastes. CERCLA's primary goal is to protect and preserve the public health and the environment from the releases or threatened releases of hazardous substances to the environment.<sup>113</sup> EPA's proposed exemption violates the primary purpose of CERCLA.

- The decision to exempt is negligent and irresponsible: EPA should dedicate sufficient resources to its responsibilities rather than exempt them.

If the EPA believes that the reporting of such hazardous air emissions from animal wastes creates a "reporting burden" that will result in "no Federal, state or local emergency response"<sup>114</sup> they should strongly re-examine the reporting methods, subsequent mitigation techniques and agency resources and personnel dedicated to this aspect of its duties. What is clear from the proposed rule and the above analysis of the plethora of emissions it will exempt is that its impetus of the rule is not that these are not significant emissions with vast foreseeable impacts on health and environment. Rather, the EPA feels it does not have sufficient resources to properly dedicate to the reporting of these emissions. This is not a just basis upon which to exempt harmful emissions and a terrible precedential rationale for potential future exemptions of CERCLA and other environmental protection responsibilities.

The solution to decreasing air pollution from animal waste is not in simply exempting polluters from reporting these standards; rather, EPA must look at the type of facilities that are generating unnecessary and disproportionate pollution. CAFOs and other large-scale animal feeding operations concentrate pollutants and employ methods that continue to perpetuate a system that contributes to excessive pollution. Such blatant violations on established air quality regulations need to be reported and prosecuted to the fullest extent of the law,<sup>115 116</sup> for the safety and health of employees, local communities and the environment.

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<sup>112</sup> Id. at 12

<sup>113</sup> See Voluntary Purchasing Groups v. Reilly, 889 F.2d 1380, 1386 (5<sup>th</sup> Cir. 1989); Dedham Water Co. v. Cumberland Farms Dairy, 805 F.2d 1074, 1081 (1<sup>st</sup> Cir. 1986); New York v. Shore Realty Corp., 759 F.2d 1032, 1040 n.7 (2d Cir. 1985); O'Neil v. Picillo, 682 F. Supp. 706, 726 (D.R.I. 1988) aff'd 883 F.2d 176 (1<sup>st</sup> Cir. 1989).

<sup>114</sup> Id. at 1

<sup>115</sup> CERCLA Section 103(b) imposes criminal sanctions for the failure to notify the government of releases of hazardous substances in particular quantities. Section 103(c) and (d), the community right to know provisions, require notification to the government and record keeping for treatment, storage, and disposal of

- Addressing Climate Change Requires More, Not Less, Urgent Government Action and Oversight.

The EPA is required to protect the public health and the environment pursuant to CERCLA and other statutes. By concluding that such release reporting is unnecessary in these instances because EPA's response would not be "necessary or appropriate" if the hazardous substances release came from animal waste at farms rather than from tanks, pipes, vents or other situations is completely irresponsible.<sup>117</sup> This wholesale exemption--of a significant class of emissions, as carefully detailed above--should not be permitted simply because the agency does not believe it has the institutional resources to respond in these types of cases, or does not at this time "foresee a situation where the Agency would take any future response action as a result" of the notification."<sup>118</sup> The status quo of governmental assessment of its actions must change: It is no exaggeration to note that climate change is the greatest challenge that humanity faces. These reportable emissions are part of that problem. The U.S. government should be moving towards more monitoring and assessment of climate change impacts, such as CAFO emissions, not less oversight and wholesale exemption from reporting requirements.

It is difficult to know exactly what information will be crucial in making climate change assessments. In November 2007, the International Panel on Climate Change (IPCC) concluded that warming of the global climate system as a result of human-related activity is now "unequivocal." And recently, the Supreme Court has recognized the scientific findings of the IPCC and held that "[t]he harms associated with climate change are serious and well recognized."<sup>119</sup> Portending the climate change world that awaits us, just this month a piece Antarctica's Wilkins ice shelf the size of Connecticut shattered outpacing predictions of most scientists. If our society is able to tackle the challenges posed by climate change it will need to alter the behavior of many institutions not the least of which is its own government.

In combating climate change, the affects of U.S. governmental activity on greenhouse gas emissions and sinks and the potential impact of climate change on projects overseen and regulated by the federal government have often been overlooked. With the effects of climate change becoming more and more evident, prompt action needs to be taken to ensure that climate change analyses is integrated into all levels of governmental agency planning. Accordingly, in this case *more* oversight and reporting of potential climate change impacts from CAFOs and other sources is needed, not less, as the rule proposes.

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hazardous wastes. Violations can result in maximum of five years' imprisonment and significant fines. See, e.g., United States v. Freter, 31 F.3d 783 (9<sup>th</sup> Cir. 1994).

<sup>116</sup> CERCLA Section 103(b) imposes criminal sanctions for the failure to notify the government of releases of hazardous substances in particular quantities. Section 103(c) and (d), the community right to know provisions, require notification to the government and record keeping for treatment, storage, and disposal of hazardous wastes. Violations can result in maximum of five years' imprisonment and significant fines. See, e.g., United States v. Freter, 31 F.3d 783 (9<sup>th</sup> Cir. 1994).

<sup>117</sup> 72 Fed. Reg. at 73704.

<sup>118</sup> 72 Fed. Reg. at 73704.

<sup>119</sup> Mass. v. EPA, 127 S.Ct. 1438 (2007).

Further, CERCLA's primary goal is to protect and preserve the public health and the environment from the releases or *threatened releases* of hazardous substances to the environment.<sup>120</sup> The CAFO releases are threatened future releases as well, and are properly included in CERCLA's ambit. CAFOs emit significant amount of hazardous air emissions, including ammonia, methane and other volatile organic compounds.<sup>121</sup> These emissions can threaten the health of rural residents and neighboring communities. EPA does not have the authority to deny rural residents and communities the protections of CERCLA and the Community-Right-to Know law.

EPCRA reporting requirements provide an incentive for CAFOs to improve their management of hazardous substances and include the cost of that control in their business plans. EPA should not ignore its legal duty to protect the public from hazardous air emissions for the special benefit of CAFOs.

There is no legal, scientific, or rational basis for EPA's decision to excuse farms, and specifically the CAFO industry, with this exemption.

Respectfully Submitted,

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<sup>120</sup> See Voluntary Purchasing Groups v. Reilly, 889 F.2d 1380, 1386 (5<sup>th</sup> Cir. 1989); Dedham Water Co. v. Cumberland Farms Dairy, 805 F.2d 1074, 1081 (1<sup>st</sup> Cir. 1986); New York v. Shore Realty Corp., 759 F.2d 1032, 1040 n.7 (2d Cir. 1985); O'Neil v. Picillo, 682 F. Supp. 706, 726 (D.R.I. 1988) aff'd 883 F.2d 176 (1<sup>st</sup> Cir. 1989).

<sup>121</sup> *Id.* at 13 ad hoc