

BEFORE THE UNITED STATES  
ENVIRONMENTAL PROTECTION AGENCY

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THE HUMANE SOCIETY OF THE UNITED STATES, ASSOCIATION  
OF IRRITATED RESIDENTS, CENTER ON RACE, POVERTY AND  
THE ENVIRONMENT, CLEAN AIR TASK FORCE, DAIRY  
EDUCATION ALLIANCE, EL COMITÉ PARA EL BIENESTAR DE  
EARLIMART, ENVIRONMENTAL INTEGRITY PROJECT, FRIENDS  
OF THE EARTH, AND WATERKEEPER ALLIANCE

*Petitioners.*

v.

LISA P. JACKSON, ADMINISTRATOR,  
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,

*Respondent.*

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**PETITION TO LIST CONCENTRATED ANIMAL FEEDING  
OPERATIONS UNDER CLEAN AIR ACT SECTION 111(B)(1)(A)  
OF THE CLEAN AIR ACT, AND TO PROMULGATE  
STANDARDS OF PERFORMANCE UNDER CLEAN AIR ACT  
SECTIONS 111(B)(1)(B) AND 111(D).**

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## I. INTRODUCTION

The Humane Society of the United States, Association of Irrigated Residents, Center on Race, Poverty and the Environment, Clean Air Task Force, Dairy Education Alliance, El Comité para el Bienestar de Earlimart, Environmental Integrity Project, Friends of the Earth, and Waterkeeper Alliance (the Coalition) hereby petitions the United States Environmental Protection Agency (EPA) to use its authority under Clean Air Act (CAA) section 111, 42 U.S.C. § 7411, to list concentrated animal feeding operations (CAFOs) as a category of sources under CAA section 111(b)(1)(A), to promulgate standards of performance for new CAFOs under CAA section 111(b)(1)(B), and to prescribe regulations for state performance standards for existing CAFOs under CAA section 111(d).

Over the last several decades, increasing numbers of animals are being raised in fewer, but larger, operations, in which animals are intensively confined in small spaces such as battery cages, veal and gestation crates, and other warehouse-like conditions.<sup>1</sup> The increased waste and emissions associated with this production method result in air pollution that contributes to climate change,<sup>2</sup> causes serious public health concerns, and harms the environment.<sup>3</sup> The Food and Agriculture Organization of the United Nations (FAO) deemed the livestock sector “one of the top two or three most significant contributors

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<sup>1</sup> RL KELLOGG RL, ET AL, USDA NATURAL RES. CONSERVATION SERV., MANURE NUTRIENTS RELATIVE TO THE CAPACITY OF CROPLAND AND PASTURELAND TO ASSIMILATE NUTRIENTS: SPATIAL AND TEMPORAL TRENDS FOR THE UNITED STATES (2000), *available at* [www.nrcs.usda.gov/technical/NRI/pubs/mannttr.pdf](http://www.nrcs.usda.gov/technical/NRI/pubs/mannttr.pdf); *see also* U.S. Environmental Protection Agency (EPA) Emission Stand. Div., Office of Air Quality Planning and Stand., Emissions From Animal Feeding Operations, Preliminary draft report xi (Aug. 15, 2001), *available at* [www.epa.gov/ttn/chief/ap42/ch09/draft/draftanimalfeed.pdf](http://www.epa.gov/ttn/chief/ap42/ch09/draft/draftanimalfeed.pdf) [hereinafter U.S. EPA Emissions from AFOs].

<sup>2</sup> See H. Steinfeld et al., U.N. Food & Agric. Org., Livestock's Long Shadow: Environmental Issues and Options 272 (2006), *available at* <http://www.fao.org/docrep/010/a0701e/a0701e00.htm> [hereinafter FAO Livestock's Long Shadow].

<sup>3</sup> American Public Health Association. 2003. Precautionary moratorium on new concentrated animal feed operations. Policy Number 2003-7. [www.apha.org/advocacy/policy/policysearch/default.htm?id=1243](http://www.apha.org/advocacy/policy/policysearch/default.htm?id=1243).

to the most serious environmental problems, at every scale from local to global.”<sup>4</sup> This same report found that animal agriculture was responsible for contributing to greenhouse gas emissions more than even the transport sector.<sup>5</sup> Pollution from farm animal production is only continuing to increase, making emissions from farm animal production some of the nation’s largest anthropogenic sources of pollution.<sup>6</sup>

Despite clear evidence that factory farms contribute significantly to anthropogenic emissions of methane, nitrous oxide, hydrogen sulfide, and ammonia, the EPA does not require CAFOs to meet any testing, performance, or emission standards under the Clean Air Act. Given available evidence, however, it is unreasonable for the EPA Administrator not to find immediately that air emissions from CAFOs cause and contribute significantly to air pollution that is reasonably anticipated to endanger public health and welfare. Because CAFOs emit significant amounts of these pollutants, all of which have been shown to have negative effects on human and animal health and on welfare (including adverse effects on climate and the environment in the United States), the Administrator must promulgate nationwide standards of performance to minimize the impacts from new existing CAFOs, and standardize the currently developing patchwork of state and local regulation of existing CAFOs.

The Coalition has a vital interest in reducing emissions of the major pollutants from CAFOs to improve human health, reduce suffering in farm animals, protect habitats for wildlife, reduce pollution problems that keep our members from enjoying wildlife, and reduce the effects of climate change and other pollution problems.

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<sup>4</sup> FAO Livestock’s Long Shadow at xx.

<sup>5</sup> *Id.* at 272.

<sup>6</sup> Nat’l Risk Mgmt Research Laboratory, Review of Emission Factors and Methodologies to Estimate Ammonia Emissions From Animal Waste Handling 1 (2002), *available at* <http://www.epa.gov/ORD/NRMRL/Pubs/600R02017/600R02017.pdf>.

Listing CAFOs under section 111, and promulgating strong national air emissions performance standards for new and existing CAFOs will have an immediate positive impact on public health, climate, animal health, and environmental integrity. Numerous scientific surveys, including the U.S. Inventory Report adopted by the EPA, establish that CAFOs meet the standards for regulation under section 111 of the Clean Air Act because they cause or contribute significantly to air pollution which endangers public health and welfare. 42 U.S.C. § 7411(b)(1)(A). Moreover, as set forth herein, CAFOs are a significant source of short-term climate forcing air pollutants – setting performance standards for these pollutants will yield immediate positive climate benefits. CAFOs also contribute significantly to other air pollution that has direct adverse impacts on public health, and animal welfare. Promulgating new source performance standards will create a strong incentive for new CAFOs to use production methods that protect public health and welfare and will allow enforcement by the government or private citizens when factory farms violate those emissions limits. In addition, U.S. EPA must act to immediately prescribe regulations for states to set performance standards for existing CAFOs.

The threat to public health and welfare caused by the greenhouse gases and other air pollutants emitted by CAFOs necessitates an immediate determination that CAFOs cause or contribute significantly to the air pollution that endangers public health and welfare, the listing of the CAFO industry, and its regulation by EPA under CAA section 111. It is unreasonable, therefore, for the Administrator not to list CAFOs under section 111(b)(1)(A), as an industry requiring regulations under CAA sections 111(b)(1)(B) and (d), that reflect the “degree of emission limitation achievable through the best system of emissions reduction that has been adequately demonstrated”. 42 U.S.C. §§ 7411(a)(1), (b), (d).

Accordingly, for the reasons discussed herein and in the accompanying record materials, The Coalition respectfully requests the EPA, pursuant to section 553(e) of the Administrative Procedure Act, 5 U.S.C. § 553(e), to undertake a rulemaking that:

1. finds that the air pollutants hydrogen sulfide and ammonia constitute air pollution that endangers U.S. public health or welfare;
2. announces the Administrator's judgment that emissions of methane, nitrous oxide, hydrogen sulfide, ammonia, volatile organic compounds, and particulate matter from CAFOs contribute significantly to air pollution that is reasonably anticipated to endanger public health and welfare;
3. lists CAFOs as a category of stationary sources pursuant to Section 111(b), of the Clean Air Act, 42 U.S.C. § 7411(b); and
4. promulgates for CAFOs performance standards for air emissions of methane, nitrous oxide, hydrogen sulfide, ammonia, volatile organic compounds, and particulate matter from new and existing CAFOs pursuant to the authority of sections 111(b) and 111(d) of the Clean Air Act, 42 U.S.C. §§ 7411(b), (d).

## **II. INTERESTS OF THE PETITIONERS**

The Coalition is a group of international, national, and regional organizations whose missions all include advocating against practices that result in unhealthy levels of pollutants being discharged from industrial animal agriculture. Together the Coalition members have millions of members and constituents who are concerned about the pollution from industrial animal agriculture. Members and constituents of the Coalition are affected by the impacts of climate change and other pollution problems caused by CAFOs. These millions of members have a strong personal interest in protecting their own health as well as in conserving and ensuring the safety of animals affected by climate change. The Coalition files this petition on behalf of itself and its adversely affected members and constituents.

The Humane Society of the United States (the HSUS) is a national and international non-profit charitable organization that promotes the protection of all animals.

The HSUS maintains its headquarters in Washington, D.C., and has offices, affiliates, or staff in 25 states, the District of Columbia, and five foreign countries.<sup>7</sup> Through its policy, legislative, litigation, and grass-roots activities, The HSUS has become the nation's largest and most effective animal protection organization, with more than 10.5 million members and constituents. The HSUS actively advocates against practices that harm all animals, including practices that result in unhealthy levels of pollutants being discharged into farm animal and wildlife habitats. Members of The HSUS in the Lathrop, California community have recently teamed up with The HSUS to bring a suit against a large chicken CAFO that emits toxic levels of ammonia into their neighborhood.

The Association of Irrigated Residents (AIR) is an unincorporated association with members residing in Kings, Tulare, Kern, Fresno, and Stanislaus counties, all of which are located in the San Joaquin Valley air basin in California. AIR's organizational purpose is to advocate for air quality and environmental health in the San Joaquin Valley.

Established in 1999 after a pesticide accident, El Comité para el Bienestar de Earlimart is an unincorporated association dedicated to protecting environmental health and advocating for air quality and reducing pesticide use in the San Joaquin Valley. El Comité's members reside in Earlimart, California. El Comité has been active in educating community members on pesticide and air pollution regulations and how to report violations. However, a more important goal for El Comité is empowering community residents to fight the low-level, day-to-day pollution whose cumulative effect is more significant than the larger, more visible accidents.

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<sup>7</sup> AL, AR, AZ, CA, FL, GA, IL, IN, KS, KY, LA, RI, MN, NC, NJ, NY, OH, OK, OR, PA, RI, TN, TX, VA, WA, Canada, Indonesia, Australia, United Kingdom, and Costa Rica.



Clean Air Task Force (CATF) is a national non-profit organization dedicated to restoring clean air and healthy environments, including securing advances against climate change through scientific research, public education, and legal advocacy. Our efforts include advocacy aimed not only at securing CO2 emissions reductions, but also mitigating the climate change impacts associated with major sources of climate forcing air pollutants such as methane. As set forth in this petition, concentrated animal production activities are significant sources of climate forcing air pollution causing significant public health and environmental impacts, and therefore fall squarely within the universe of sources for which CATF seeks emissions reductions.

The Center on Race, Poverty & the Environment is a non-profit organization that provides legal and technical assistance to the grassroots movement for environmental justice. The Center has offices in San Francisco and Delano, California.

The Dairy Education Alliance (DEA) is a national coalition of farmers, grass-roots activists, environmentalists, scientists, public interest lawyers and economists from around the country working collaboratively to tackle the environmental, social and economic problems associated with industrial-sized dairy operations (CAFOs). The DEA currently has member organizations from over 10 states. Some of our member organizations include: Amargosa Citizens for the Environment (NV); Advocates for the West (ID); Center on Race, Poverty and the Environment (CA); Community Association for Restoration of the Environment (WA); Environmentally Concerned Citizens of South Central Michigan (MI); Family Farms for the Future (MO); Idaho Concerned Area Residents for the Environment (ID); Idaho Rural Council (ID); Neighbors United for the Finger Lakes (NY); Northwest Environmental Defense Center (OR); Socially Responsible Agricultural Project; and the Western Environmental Law Center. The DEA's goal is to ensure that dairy CAFOs operate

in a socially responsible way, to hold the industry accountable, and to educate the public, elected officials, and government regulators about the serious environmental and economic damage being caused by industrial-sized dairies.

The Environmental Integrity Project (EIP) is a nonpartisan, nonprofit organization established in March of 2002 by former EPA enforcement attorneys to advocate for more effective enforcement of environmental laws. EIP's three objectives are to provide an objective analysis of how the failure to enforce or implement environmental laws increases pollution and affects the public's health, to hold federal and state agencies, as well as individual corporations, accountable for failing to enforce or comply with environmental laws, and to help local communities in key states obtain the protection of environmental laws. EIP's enforcement work in the Midwestern United States focuses on greater regulation of air and water pollution from Concentrated Animal Feeding Operations (CAFO's). EIP strives to empower local communities affected by CAFOs and to hold CAFOs accountable for harm to the environment.

Friends of the Earth, Inc. (FoE) is an environmental advocacy organization founded in 1969 and incorporated in the District of Columbia. FoE has offices in Washington, D.C. and San Francisco, C.A., with approximately 30,000 members across the nation. FoE's mission is to protect the planet from environmental degradation; preserve biological, cultural and ethnic diversity, and to empower citizens to affect the quality of their environment and their lives. The health and environmental interests of FoE, and its members, are impacted by the pollution created by concentrated animal feeding operations.

Waterkeeper Alliance (Waterkeeper) is an international nonprofit organization representing the interests of 182 member watershed groups. Waterkeeper, along with each of its member groups, is dedicated to the preservation and protection of waterbodies and

their neighboring communities. Aligned with this mission, Waterkeeper is concerned with the impacts of concentrated animal production on public health and the environment, and it seeks to reduce these impacts by actively advocating for the control of animal waste pollution, reduction of pollution runoff, and promotion of sustainable agriculture.

### **III. LEGAL BACKGROUND**

#### **A. The Clean Air Act**

The CAA is the major federal statute regulating air quality and air pollution. The Act was enacted “to protect and enhance the quality of the Nation’s air resources so as to promote the public health and welfare and the productive capacity of its population.” 42 U.S.C. § 7401(b)(1). The EPA is the agency charged with the Act’s mission and the national leader for the federal air programs and the delegating authority to state programs.

#### **1. Section 111: New Source Performance Standards**

In 1970, Congress amended the Act to include nationwide uniform emission standards for categories of stationary sources to complement national ambient air quality standards and prevent new pollution problems. 42 U.S.C. § 7411. Section 111 addresses air pollution problems that endanger public health and welfare, and are common to an industry. Section 111 performance standards apply regardless of a region’s ambient air quality and are triggered when a new source is constructed or an existing source undergoes a major modification. The Act requires the EPA Administrator to set and revise “a list of categories of stationary sources” that “cause[ ], or contribute[ ] significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare.” 42 U.S.C. § 7411(b)(1)(A). Section 111 further requires the Administrator to set standards of performance for new sources in a listed category within one year of listing, 42 U.S.C. §

7411(b)(1)(B), and to prescribe regulations for existing sources in a listed category, 42 U.S.C. § 7411(d). Performance standards under section 111 are to “reflect[ ] the degree of emission limitation achievable through the application of the best system of emissions reductions which (taking into account the cost of achieving such reduction and any nonair quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated.” *Lignite Energy Council v. U.S. E.P.A.*, 198 F.3d 930, 932 (C.A.D.C., 1999); 42 U.S.C. § 7411(a)(1).<sup>8</sup>

## 2. Section 302: Definitions

A stationary source is defined as “any building, structure, facility, or installation which emits or may emit an air pollutant.” 42 U.S.C. § 7411(a)(3). In determining what meets the standard for listing for a category of sources in section 111, the Act defines several terms to guide its decision making. 42 U.S.C. § 7602. An “air pollutant” is broadly defined as “any air pollution agent or combination of such agents, including any physical, chemical, biological...substance or matter which is emitted into or otherwise enters the ambient air. Such term includes any precursors to the formation of any air pollutant...” 42 U.S.C. § 7602(g). To determine whether a particular air pollutant meets the endangerment standard required by section 111, the Administrator takes into account its effect on public health and welfare. While “public health” is not defined in the CAA, the legislative history defines the term broadly. *See American Lung Ass'n v. E.P.A.*, 134 F.3d 388, 388 (D.C. Cir. 1998). The Act clarifies welfare and states that “[a]ll language referring to effects on welfare includes, but is not limited to, effects on soils, water, crops, vegetation, man-made materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on

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<sup>8</sup> This technology requirement is known as “best demonstrated technology.”

personal comfort and well-being, whether caused by transformation, conversion, or combination with other air pollutants.” 42 U.S.C. § 7602(h). This sweeping definition guides and supports the Administrator’s ability to list and regulate new and existing CAFOs under CAA section 111 as shown herein.

#### **IV. FACTUAL BACKGROUND**

There is no dispute that CAFOs produce and emit gases and particulates into the ambient air caused by their intensive animal production, waste storage, and disposal practices. Many of the gases and particulates produced from CAFOs have been incontrovertibly linked to several health and environmental harms. Notable among the effects of these gases and particulates are climate change, risks to human and animal respiratory health, haze, ecosystem acidification and eutrophication, and odors.

##### **A. Climate Change**

The role of human activities in climate change is no longer in question.<sup>9</sup> The Intergovernmental Panel on Climate Change’s (IPCC’s) Fourth Assessment Report established that anthropogenic emissions of greenhouse gases, including methane and nitrous oxide, which are released by CAFOs, are accelerating the warming of the Earth’s atmosphere.<sup>10</sup> Temperature readings taken around the world in recent decades, as well as scientific studies of tree rings, coral reefs, and ice cores, show that average global

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<sup>9</sup> See EPA Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act 74 Fed. Reg. 18886 (April 24, 2009) [hereinafter EPA GHG Endangerment Finding].

<sup>10</sup> Intergovernmental Panel on Climate Change [IPCC], Fourth Assessment Report, Climate Change 2007: Synthesis Report, Summary for Policymakers 2 (2007), available at [http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4\\_syr\\_spm.pdf](http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf) [hereinafter IPCC Synthesis Report].

temperatures have risen substantially since the Industrial Revolution began in the 1750s.<sup>11</sup> Of particular concern is the fact that these increases have been accelerating more rapidly since the 1970s.<sup>12</sup> “Global mean surface temperatures have risen by 0.74 °C (1.3 °F) over the last 100 years.”<sup>13</sup> The IPCC predicts temperature rises of 1.8-4.0°C (3.2-7.2°F) by 2100.<sup>14</sup> These temperature rises are much greater than those seen during the last century when average temperatures rose only 0.06°C (0.12°F) per decade.<sup>15</sup> Since the mid-1970s, however, the rate of increase in temperature rises has tripled.<sup>16</sup> Eight of the ten warmest years ever recorded have all occurred since 2001,<sup>17</sup> and there has been a mean surface temperature increase of 0.6±0.2°C (1.08±0.36°F) in just the last 30 years.<sup>18</sup>

These changes in the Earth’s atmosphere are causing significant environmental damage. Worldwide, glaciers are in retreat, the tundra is thawing, sea ice is melting, the sea level is rising, and some species are rapidly disappearing.<sup>19</sup>

While climate change is a global issue, the United States in particular will face serious environmental changes. According to the EPA, “North America is projected to warm between 3.6-18 °F (2-10 °C) by 2100, depending on the region” with effects from that

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<sup>11</sup> *Summary for Policymakers*, in CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, CONTRIBUTION OF WORKING GROUP I TO THE FOURTH ASSESSMENT REPORT OF THE INTERNATIONAL PANEL ON CLIMATE CHANGE 9 (Susan Solomon et al. eds., 2007) [hereinafter IPCC Physical Science Summary], available at <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf>.

<sup>12</sup> See IPCC Synthesis Report at 4.

<sup>13</sup> Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 18895-18896, 18899 (proposed Apr. 24, 2009) (to be codified at 40 CFR Ch. 1) [hereinafter EPA GHG Endangerment Finding].

<sup>14</sup> See IPCC Physical Science Summary 13-14.

<sup>15</sup> U.S. National Oceanic and Atmospheric Administration (NOAA). 2007. NOAA says U.S. winter temperature near average, global December-February temperature warmest on record. Press release (Washington, DC: March 15, 2007), available at <http://www.noaanews.noaa.gov/stories2007/s2819.htm> (last visited May 1, 2009).

<sup>16</sup> *Id.*

<sup>17</sup> EPA GHG Endangerment Finding at 18896.

<sup>18</sup> National Aeronautics and Space Administration Goddard Institute for Space Studies. 2006. 2005 warmest year in over a century, available at [www.nasa.gov/vision/earth/environment/2005\\_warmest.html](http://www.nasa.gov/vision/earth/environment/2005_warmest.html) (last visited May 1, 2009).

<sup>19</sup> IPCC Synthesis Report at 2-9.

increase impacting every region.<sup>20</sup> Specifically, the average annual temperatures in the United States are now approximately 1.25°F (0.69°C) warmer than at the turn of the 20<sup>th</sup> century<sup>21</sup> and average temperatures are expected to continue to increase.<sup>22</sup> The IPCC reports, and the EPA agrees, that the United States will “warm disproportionately” to tropic and subtropic zones as temperatures continue to increase.<sup>23</sup>

Not only is the data establishing that global warming and climate change is unequivocal, but the projections for devastating impacts accelerate with each year of documented science. In 2006, top scientists from the National Center for Atmospheric Research estimated that the Arctic sea ice was melting at a rate that will lead to its complete disappearance by 2040.<sup>24</sup> In 2007, data from the National Aeronautics and Space Administration (NASA) and National Center for Atmospheric Research caused climate scientists to conclude that the Arctic Ocean would be almost entirely without ice in several decades, with one scientist reviewing his own data and concluding it could be as early as the end of 2012.<sup>25</sup>

## **B. The United States Animal Production Industry**

A CAFO is an animal feeding operation (AFO) that meets a certain criterion identified by the number of animals kept and raised in confinement. 40 C.F.R. § 122.23(b)(4). These operations, according to EPA, “congregate animals, feed, manure and urine, dead animals, and production operations on a small land area. Feed is brought to the

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<sup>20</sup> EPA, Climate Change - Health and Environmental Effects: U.S. Regions (Apr. 29, 2009), *available at* <http://www.epa.gov/climatechange/effects/usregions.html#ref> (last visited May 6, 2009).

<sup>21</sup> EPA GHG Endangerment Finding at 18898.

<sup>22</sup> *Id.*

<sup>23</sup> EPA, Climate Change – Health and Environmental Effects, *supra* note 20.

<sup>24</sup> J. Stroeve, et. al, *Arctic sea ice decline: Faster than forecast*, GEOPHYS. RES. LETT., May 1, 2007, at 34 see Attach. 1.

<sup>25</sup> Seth Borenstein, *Rate of Ice Melt Shocks Warming Experts*, ASSOCIATED PRESS, Dec. 11, 2007, *available at* <http://www.msnbc.msn.com/id/22203980/> (last visited May 6, 2009).

animals rather than the animals grazing or otherwise seeking feed in pastures, fields, or on rangeland.”<sup>26</sup> 40 C.F.R. § 122.23 (2003). Because these industrialized, “landless” facilities<sup>27</sup> usually produce more manure than can be used as fertilizer on nearby cropland,<sup>28</sup> enormous quantities of manure are either stored on-site or disposed onto a small area of land resulting in air pollutant emissions that endanger humans and the environment.<sup>29</sup> AFOs produce 500 million tons of manure every year, more than 3.3 times the amount of waste humans in the United States produce each year and the majority of waste from farm animal production.<sup>30</sup>

EPA reports that in 2006 there were approximately 450,000 AFOs and 18,800 CAFOs in the United States.<sup>31</sup> While the number of CAFOs may seem comparatively small to the number of AFOs, those CAFOs produce the majority of farm animal products: CAFOs comprise only 5 percent of all AFOs in the United States yet produce more than 50 percent of land-based animals raised for food domestically.<sup>32</sup> As recently as 1997, the 2 percent of

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<sup>26</sup> EPA, *What is a CAFO?* (Feb. 27, 2008), available at <http://www.epa.gov/Region7/water/cafo/index.htm> (last visited May 4, 2009).

<sup>27</sup> See generally, Food and Agriculture Organization of the United Nations. Responding to the “Livestock Revolution”—The Case for Livestock Public Policies (2005), available at <ftp://ftp.fao.org/docrep/fao/010/a0260e/a0260e00.pdf>.

<sup>28</sup> U.S. EPA Emissions from AFOs at xi.

<sup>29</sup> American Public Health Association. 2003. Precautionary moratorium on new concentrated animal feed operations. Policy Number 2003-7. [www.apha.org/advocacy/policy/policysearch/default.htm?id=1243](http://www.apha.org/advocacy/policy/policysearch/default.htm?id=1243).

<sup>30</sup> The U.S. Department of Agriculture estimates annual AFO waste production at 500 million tons, while EPA estimates that 150 million tons of waste is generated by the U.S. population each year. See 68 Fed. Reg. 7,176, 7,180 (Feb. 12, 2003) (Final Rule for National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitation Guidelines and Standards for Concentrated Animal Feeding Operations).

<sup>31</sup> EPA, *Animal Feeding Operations*, March 19, 2008, available at <http://www.epa.gov/oecaagct/anafoidx.html> (last visited May 1, 2009); see also EPA *Fact Sheet: Concentrated Animal Feeding Operations Proposed Rulemaking*, June 1, 2006, available at [http://www.epa.gov/npdes/regulations/cafo\\_revisedrule\\_factsheet.pdf](http://www.epa.gov/npdes/regulations/cafo_revisedrule_factsheet.pdf).

<sup>32</sup> Doug Gurian-Sherman, Union of Concerned Scientists, *CAFOs Uncovered: The Untold Costs of Confined Animal Feeding Operations 2* (2008) [hereinafter UCS Report], available at [http://www.ucsusa.org/food\\_and\\_agriculture/science\\_and\\_impacts/impacts\\_industrial\\_agriculture/cafos-uncovered.html](http://www.ucsusa.org/food_and_agriculture/science_and_impacts/impacts_industrial_agriculture/cafos-uncovered.html), citing M. Ribaud et al., *Manure management for water quality: Costs to animal*



feedlots with more than 1,000 cattle produced 85 percent of the beef sold in the United States.<sup>33</sup> Pig facilities with more than 5,000 animals made up 1.7 percent of the farms but produced over 40 percent of the pigs raised in the United States.<sup>34</sup> Similarly, only 11 percent of broiler chicken operations accounted for almost half of the U.S. annual chicken production.<sup>35</sup>

Over the last two decades, “[s]mall and medium-sized livestock operations have been replaced by large operations at a steady rate.”<sup>36</sup> While the number of farms producing animals has greatly declined, the number of animals raised has increased over the past 20 years. From 2002 to 2005, the CAFO industry had a “growth factor of approximately 22 percent due to industry expansion and the trend toward larger, more concentrated facilities.”<sup>37</sup>

### C. CAFOs Produce Air Pollutants

Animal production inherently creates emissions of substances that are considered air pollutants. CAFOs emit more pollutants than traditional, small-scale farms because they raise animals in much larger numbers in smaller spaces. Pollutants from CAFOs are emitted from three primary sources: (1) confinement facilities; (2) manure treatment and

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*feeding operations of applying nutrients to land*, Agricultural economic report no. 824. Economic Research Service, Resource Economics Division, USDA (2003), see Attach. 2 for citing authority.

<sup>33</sup> U.S. EPA Emissions from AFOs at 3-1.

<sup>34</sup> U.S. EPA Emissions from AFOs at 5-3 (Table 5-2).

<sup>35</sup> *Id.* at 6-2.

<sup>36</sup> Robert L. Kellogg, et al., U.S. Dep’t of Agric. (USDA) Natural Res. Conservation Serv., Manure nutrients relative to the capacity of cropland and pastureland to assimilate nutrients: spatial and temporal trends for the United States (2000), *available at* <http://www.nal.usda.gov/wqic/manure.shtml>.

<sup>37</sup> Revised National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitation Guidelines for Concentrated Animal Feeding Operations in Response to Waterkeeper Decision; Proposed Rule, 71 Fed. Reg. 37744, 37774 (June 30, 2006).

storage systems; and (3) disposal of animal manure.<sup>38</sup> Each source emits its own particular combination of pollutants that contribute directly to climate change and other air pollution problems.<sup>39</sup>

Confinement facilities can range from totally enclosed structures to open unpaved lots. Generally, all animals are confined in enclosed structures with the exception of cattle raised for beef and cows in certain dairy confinement facilities.<sup>40</sup> While the particular combination of pollutants emitted from a confinement facility depend on the species of animal confined and the manure management system in place, all confinement facilities produce emissions. Confinement facility emissions can include particulates and gases from the animals, feed, flooring, substances emitted directly from the animals, and emissions from waste before it is removed for disposal.<sup>41</sup>

Additional air emissions come from manure management systems. Animal waste is stored in solid, slurry, or liquid states depending on the species of animal and the facility's practice.<sup>42</sup> Waste can be stored in the confinement facility or in a separate covered or uncovered storage area. The way manure is collected, stored, and disposed of dramatically changes the type and intensity of air pollutant emissions from CAFOs. For example, dry manure handling methods increase nitrous oxide and particulate matter emissions, while wet manure methods increase methane and hydrogen sulfide emissions.<sup>43</sup> Manure removal

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<sup>38</sup> U.S. EPA Emissions from AFOs at 2-2; *see also* Iowa State Univ. & the Univ. of Iowa Study Group, Iowa Concentrated Animal Feeding Operations Air Quality Study, Final Report 35-39 (2002), *available at* [http://www.ehsrc.uiowa.edu/cafo\\_air\\_quality\\_study.html](http://www.ehsrc.uiowa.edu/cafo_air_quality_study.html). at 39 [hereinafter Iowa CAFO Study].

<sup>39</sup> U.S. EPA Emissions from AFOs at 2-4, 2-5.

<sup>40</sup> *Id.* at 2-2-2-3.

<sup>41</sup> *Id.* at 2-1 - 2-3. *See also*, Iowa CAFO Study at 39.

<sup>42</sup> U.S. EPA Emissions from AFOs at 2-1.

<sup>43</sup> Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006 6-8 (2008), *available at* [http://www.epa.gov/climatechange/emissions/downloads/08\\_ES.pdf](http://www.epa.gov/climatechange/emissions/downloads/08_ES.pdf) [hereinafter EPA Inventory of GHGs]; *see also* U.S. EPA Emissions from AFOs at 2-15. In dry manure management systems, manure is typically collected from open lots or enclosed confinement areas and periodically placed in a separate

cycles, which can vary from daily to once per production cycle, also affect emission type and concentration.<sup>44</sup>

Almost all CAFO waste is eventually disposed on land.<sup>45</sup> Land disposal of manure involves a variety of management practices including: direct application of managed waste (via lagoon or dry storage pile) onto soil surfaces; direct application followed by incorporation into the soil; and injection of managed waste underneath the surface of the soil.<sup>46</sup> While manure should only be applied at rates consistent with crop nutrient requirements, CAFOs often have such high concentrations of animals that their manure is applied in excess of nutrient requirements and during time periods making crop utilization impossible.<sup>47</sup> Applying waste in excess of crop nutrient requirements results in higher emissions levels.<sup>48</sup> Emissions from land disposal occur during two phases: the short-term emissions that occur during the initial application and the long-term emissions that occur as the manure breaks down in the soil. Each land disposal practice substantially affects the type and level of short-term emissions released.<sup>49</sup>

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area to dry. Often times this manure removal method is referred to as “scraping.” Wet manure handling methods are often associated with the use of a “flush” system, or when a large volume of water is pumped through the confinement facility and the accumulated manure is discharged into a lagoon for storage. The water used to remove the waste can be fresh or recycled from the lagoon.

<sup>44</sup> U.S. EPA Emissions from AFOs, 3-9.

<sup>45</sup> *Id.* at 2-2.

<sup>46</sup> *Id.* 7-2-7-4.

<sup>47</sup> *Id.* at 7-1.

<sup>48</sup> *Id.* at 7-4-7-7.

<sup>49</sup> *Id.* at 7-4-7-5. Direct application of waste can be handled as solid or liquid waste and is spread by “broadcasting” the waste onto the soil surface by manure spreaders or irrigation. If a facility uses incorporation as its land disposal practice, the waste is plowed or disked into the soil after it is applied onto the soil surface, which results in a reduction in air emissions and odors. Injection, which involves directly injecting manure below the surface of the soil, is a method that provides the least amount of atmospheric exposure and therefore has the lowest rate of short-term emissions.

## D. Major Air Emissions from CAFOs

According to the EPA, “air quality problems associated with AFOs are caused by gases emitted from the decomposition of animal wastes and by the dust generated by animal activity and farming practices.”<sup>50</sup> CAFOs produce a large amount of air emissions with the major substances including: (1) the greenhouse gases methane and nitrous oxide, (2) hydrogen sulfide, (3) ammonia, (4) particulate matter (particulates or PM), and (5) volatile organic compounds (VOCs).<sup>51</sup> Additionally, ammonia, hydrogen sulfide, and VOCs emissions also react with chemicals in the atmosphere that later form fine particulate matter (PM<sub>2.5</sub>), adding to the amount of particulates produced by CAFOs.<sup>52</sup> These substances are known to cause and contribute to air pollution problems such as climate change, acid rain, acidification, eutrophication, smog, and limited visibility. These substances cause negative effects on animals, people, and the environment in the vicinity of the CAFO. Also, because the wind carries several CAFO air pollutants hundreds of miles, CAFOs endanger the health of even those humans, animals, and ecosystems far removed from these facilities.<sup>53</sup>

### 1. Greenhouse Gases

Methane and nitrous oxide are the predominant greenhouse gases produced by CAFOs. Methane is a greenhouse gas that is created on CAFOs by enteric fermentation in ruminant animals and anaerobic decomposition of organic matter, such as slurries and manure lagoons. Methane is a greenhouse gas that, when produced on CAFOs, is created by

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<sup>50</sup> National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitation Guidelines and Standards for Concentrated Animal Feeding Operations (CAFOs), 68 Fed. Reg. 7176, 7180.

<sup>51</sup> AD HOC COMM. ON AIR EMISSIONS FROM ANIMAL FEEDING OPERATIONS, ET AL., NAT’L RESEARCH COUNCIL, AIR EMISSIONS FROM ANIMAL FEEDING OPERATIONS: CURRENT KNOWLEDGE, FUTURE NEEDS at 50-56 (2003) [hereinafter NRC Air Emissions from AFOs]; see also Iowa CAFO Study at 39.

<sup>52</sup> NRC Air Emissions from AFOs at 52.

<sup>53</sup> See *infra* notes 73 and 156.

enteric fermentation in ruminant animals and anaerobic decomposition of organic matter, such as slurries and manure lagoons.<sup>54</sup> The global concentrations of methane and nitrous oxide have increased by 149 and 23 percents respectively from pre-industrial levels.<sup>55</sup> When considered in terms of its 100-year global warming potential, Methane has on the order of 20 times the global warming potential (GWP) of carbon dioxide. Because methane lasts in the atmosphere for only up to 15 years, however, its short-term radiative forcing effect is actually much larger, making near term reductions in this air pollutant significantly helpful in achieving immediate climate benefits.<sup>56</sup> According to the EPA, “methane absorbs terrestrial infrared radiation that would otherwise escape to space,” which contributes to atmospheric warming.<sup>57</sup> Methane also contributes to the formation of ground level (bad) ozone and is directly linked to the cooling of the stratosphere, the major cause of stratospheric (good) ozone layer destruction.<sup>58</sup> Because of the amounts humans are adding to the atmosphere and methane’s short lifetime and significant ability to absorb radiation, The IPCC has determined that methane is the second most dangerous greenhouse gas.<sup>59</sup>

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<sup>54</sup> EPA GHG Inventory at 6-1; EPA Emissions from AFOs at 2-9.

<sup>55</sup> EPA GHG Endangerment Finding at 18895.

<sup>56</sup> Please note that all global warming potentials listed in this petition are made on a 100-year timeline. P. Forster, *Changes in Atmospheric Constituents and in Radiative Forcing* in CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, CONTRIBUTION OF WORKING GROUP I TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (Susan Solomon et al. eds., 2007) [hereinafter IPCC Climate Report Ch. 2]; See also EPA, Questions and Answers: The Methane to Markets Partnership, October 19, 2006, *available at* <http://www.epa.gov/outreach/qanda.html> (last visited May 1, 2009). The 100-year GWP for methane is derived to be 23 CO<sub>2</sub>e by Forster; the EPA GHG Endangerment Finding uses 21 CO<sub>2</sub>e as the 100-year GWP for this air pollutant. EPA GHG Endangerment Finding at 18,895. When considered using a 20-year GWP, however, which is more closely aligned with its actual atmospheric residence time, methane has a GWP on the order of 72 times that of CO<sub>2</sub>. *Id.* (referencing the IPCC’s analysis).

<sup>57</sup> EPA, *Methane Science* (Oct. 19, 2006), *available at* <http://www.epa.gov/methane/scientific.html> (last visited May 1, 2009).

<sup>58</sup> See generally Union of Concerned Scientists, *Explaining Global Warming -- What's Ozone Got To Do With It?* (Nov. 2002), *available at* <http://www.ucsusa.org/assets/documents/ssi/ozone.pdf> (last visited May 4, 2009).

<sup>59</sup> EPA GHG Endangerment Finding at 18895.

Nitrous oxide is a greenhouse gas released into the ambient air from CAFOs during a bacterial process in decomposing manure. Unlike methane, nitrous oxide is most often emitted from dry conditions, such as unpaved drylots and land disposal sites.<sup>60</sup> Nitrous oxide is the only major pollutant found on CAFOs that is emitted during both phases of emissions during land disposal.<sup>61</sup> Nitrous oxide has 310 times the global warming potential of carbon dioxide and has an atmospheric lifetime of 120 years.<sup>62</sup> Nitrous oxide not only affects ozone in the stratosphere in the same way that methane does, but it also breaks down into nitric oxide in the stratosphere, which contributes to ozone destruction in all but the lowest portions of the stratosphere, allowing excess ultra-violet light to strike the Earth's surface and thus increase its warming capabilities.<sup>63</sup> Because of these factors, the IPCC deemed nitrous oxide as the third most prevalent greenhouse gas.<sup>64</sup>

## 2. Hydrogen Sulfide

Hydrogen sulfide is a poisonous, flammable gas that smells like rotten eggs. Hydrogen sulfide emissions from CAFOs most often result from the decomposition of animal manure in wet conditions.<sup>65</sup> When hydrogen sulfide is emitted as a gas, it can remain in the atmosphere for over four days.<sup>66</sup> Hydrogen sulfide is one of the principal components of the sulfur cycle that, when released in excess amounts, contributes to the

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<sup>60</sup> U.S. EPA Emissions from AFOs at 2-7.

<sup>61</sup> *Id.* at 7-6-7-7.

<sup>62</sup> IPCC Climate Report Ch. 2 at 212.

<sup>63</sup> Union of Concerned Scientists, Union of Concerned Scientists, Explaining Global Warming, *see supra* 56; *See also* NRC Air Emissions from AFOs at 52.

<sup>64</sup> IPCC Climate Report Ch. 2 at 144.

<sup>65</sup> NRC Air Emissions from AFOs at 54-55. *See also* EPA Emissions from AFOs at 2-10.

<sup>66</sup> Iowa CAFO Study at 88. *See also* Agency for Toxic Substances and Disease Registry, *Public Health Statement for Hydrogen Sulfide* (2004), available at <http://www.atsdr.cdc.gov/toxprofiles/phs114.html> (last visited May 1, 2009).

regional sulfur burden and the formation of PM<sub>2.5</sub>.<sup>67</sup> These pollutants can travel for long distances and can contribute to acid rain.<sup>68</sup> Because of its rotten egg smell at low concentrations, hydrogen sulfide is commonly responsible for the strong odors in areas local to CAFOs.<sup>69</sup> The National Research Council found CAFO emissions of hydrogen sulfide to have a “significant” effect on the quality of human life on a local basis.<sup>70</sup>

### 3. Ammonia

Ammonia is a caustic gas with a “pungent” odor that is released by CAFOs during the decomposition of organic nitrogen products such as urea in mammals, uric acid in birds, and proteins in manure.<sup>71</sup> Decomposition can occur in both wet and dry conditions, which means that ammonia is released immediately after excretion and continues to form as the waste breaks down.<sup>72</sup> The residence time of ammonia in the atmosphere is approximately one week and it can travel up to hundreds of miles throughout a region to impact the environment.<sup>73</sup> Ammonia also contributes directly to the creation of PM<sub>2.5</sub> when it is emitted into the air and joins with sulfur oxides or nitrogen oxides in the atmosphere forming ammonium sulfate or ammonium nitrate, the most abundant form of PM<sub>2.5</sub> in the San Joaquin Valley Air Basin.<sup>74</sup> Because of the composition of animal waste, those

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<sup>67</sup> The sulfur cycle is a process where sulfur compounds are released into the air and broken down into other chemicals, eventually to be redeposited back into the soil. *See generally* Environmental Literacy Council, Sulfur Cycle (Oct. 31, 2006), *available at* <http://www.enviroliteracy.org/article.php/1348.html> (last visited May 4, 2009).

<sup>68</sup> Iowa CAFO Study at 71. See also EPA, *Six Common Air Pollutants: Chief Causes for Concern*, April 8, 2008, *available at* <http://www.epa.gov/air/urbanair/so2/chf1.html> (last visited May 4, 2009).

<sup>69</sup> NRC Air Emissions from AFOs at 55.

<sup>70</sup> NRC Air Emissions from AFOs at 72.

<sup>71</sup> U.S. EPA Emissions from AFOs at 2-6; Agency for Toxic Substances and Disease Registry, Medical Management Guidelines for Ammonia (Sept. 24, 2007), *available at* <http://www.atsdr.cdc.gov/mhmi/mmg126.html> (last visited May 4, 2009).

<sup>72</sup> U.S. EPA Emissions from AFOs at 2-6.

<sup>73</sup> Agency for Toxic Substances and Disease Registry, TOXICOLOGICAL PROFILE FOR AMMONIA at 2, *available at* <http://www.atsdr.cdc.gov/toxprofiles/tp126.pdf>; NRC Air Emissions from AFOs at 52.

<sup>74</sup> *Id.*

compounds are common at CAFO sites.<sup>75</sup> According to the National Research Council, CAFO emissions of ammonia have a “major” importance in terms of the environmental impact regionally, nationally, and globally.<sup>76</sup>

#### **4. Particulate Matter (PM)**

Particulate matter is “composed of small solid and liquid particles suspended in the ambient air” that are categorized by their aerodynamic diameter.<sup>77</sup> PM can be directly emitted or formed by chemical reactions of other gases in the atmosphere.<sup>78</sup> PM from CAFOs is comprised of dry manure, bedding and feed materials, biological matter (i.e., animal dander and feathers), unpaved dirt lots, and products of feces and feed decomposition.<sup>79</sup> CAFOs contribute directly to PM through aspects of the production processes, such as animal activity, facility equipment, and storage and land disposal of manure.<sup>80</sup> CAFOs contribute indirectly to secondary PM by emitting ammonia, hydrogen sulfide, NO<sub>x</sub>, and VOCs which are converted to aerosol particles.<sup>81</sup> NRC found particulates to be a “significant” concern for their effect on local human health and contribution to haze.<sup>82</sup>

#### **5. Volatile Organic Compounds (VOCs)**

Volatile organic compounds (VOCs) are defined by the EPA as “any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical

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<sup>75</sup> Iowa CAFO Study at 37, 40.

<sup>76</sup> NRC Air Emissions from AFOs at 72.

<sup>77</sup> EPA, *PM Research* (Aug. 29, 2007), available at <http://www.epa.gov/pmresearch/> (last visited May 4, 2009).

<sup>78</sup> *Id.*

<sup>79</sup> U.S. EPA Emissions from AFOs at 2-11; Iowa CAFO Study at 35.

<sup>80</sup> *Id.*

<sup>81</sup> NRC Air Emissions from AFOs at 55; U.S. EPA Emissions from AFOs at 2-11.

<sup>82</sup> NRC Air Emissions from AFOs at 72 (Table 3-7).



reactions.” 40 C.F.R. § 51.100(s). VOCs are emitted from CAFOs through feed, fresh waste, enterically, and during the decomposition of manure in both wet and dry conditions.<sup>83</sup> CAFOs potentially emit 165 VOCs, and of these, 21 are listed in the CAA as Hazardous Air Pollutants (HAPs).<sup>84</sup> 42 U.S.C. § 7412(b). Some of the more easily recognized CAFO-emitted VOCs that are also HAPs include benzene, formaldehyde, tetrachloroethylene, methanol, toluene, and xylene.<sup>85</sup> However, there are a large number of prevalent VOCs released from CAFOs that are not listed as HAPs and would be far more appropriate regulated under section 111. Methane, which is considered a VOC, is not a listed HAP, but a greenhouse gas and an ozone precursor, as described above.

## V. DISCUSSION

Section 111 of the Clean Air Act requires the EPA Administrator to list a category of stationary sources if it “causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare,” that is, if the source category meets the statutory “endangerment standard”). 42 U.S.C. § 7411(b)(1)(A). This petition seeks the addition of CAFOs to the list of sources subject to regulation under section 111 because they meet the endangerment standard. In listing CAFOs, the Administrator must use her judgment to determine that the CAFO source category satisfies a two-part test.<sup>86</sup> First the Administrator must determine, that air pollution of the kind emitted by CAFOs “may reasonably be anticipated to endanger public health or welfare”. 42 U.S.C. § 7411(b)(1)(A). Second, the Administrator must determine that CAFOs cause or contribute significantly to this air pollution. *Id.* It is clear from the factual background above and the discussion below that CAFOs are a stationary source category

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<sup>83</sup> U.S. EPA Emissions from AFOs at 2-10.

<sup>84</sup> U.S. EPA Air Emissions from AFOs at Appendix A, A-1 to A-11.

<sup>85</sup> *Id.*

<sup>86</sup> EPA GHG Endangerment Finding at 18888 (stating “typically, the endangerment and

within the meaning of section 111, and that the air pollutants emitted by CAFOs contribute significantly to several air pollution problems that endanger public health and welfare.

The Clean Air Act does not require absolute scientific certainty or proof of actual harm when making an endangerment finding. *Massachusetts v. EPA*, 549 U.S. at 506 n.7. Additionally, the Administrator must list CAFOs and promulgate standards of performance if they “*may reasonably be anticipated*” to endanger public health or welfare. 42 U.S.C. § 7411(b)(1)(A). The EPA recognizes that the plain meaning of that phrase should “authorize, if not require, the Administrator to act to prevent harm and to act in conditions of certainty.”<sup>87</sup> The legislative history behind that language supports the notion that Congress wanted to “assure that regulatory action can effectively prevent harm before it occurs.” See *Lead Indus. Ass’n v. Env’tl. Prot. Agency*, 647 F.2d 1130, 1152, (D.C. Cir. 1980), citing H.R.Rep.No.95-294 at 49 (1977).

#### **A. CAFOs are “Stationary Sources” Within the Meaning of Clean Air Act §111 and EPA Regulations.**

Clean Air Act Section 111 defines a “stationary source” as “any building, structure, facility, or installation which emits or may emit an air pollutant.” 42 U.S.C § 7411(a)(3). EPA’s regulations under this provision furthermore clearly describe a CAFO as a “facility” because it uses the word in the regulatory definition of CAFO. 40 C.F.R. § 122.23 App. B (“an animal feeding operation where more than 1,000 'animal units' ... are confined at the *facility*...” (emphasis added)). CAFOs clearly meet the definition of a stationary source therefore, because they are “facilities” under the EPA’s regulatory definition and they emit air pollutants. Furthermore, the EPA has recognized CAFOs as stationary sources in the

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EPA GHG Endangerment Finding at 18888 (stating “typically, the endangerment and cause or contribute findings have been proposed concurrently with proposed standards under various sections of the CAA,..... Comment has been taken on these proposed findings as part of the notice and comment process for the emission standards”).

Revisions to the California State Implementation Plan, San Joaquin Valley Unified Air Pollution Control District. 68 Fed. Reg. 7330 (Feb. 13, 2003).

**B. CAFOs Emit “Air Pollutants” Under the Clean Air Act that Cause and Contribute Significantly to Air Pollution that is Reasonably Anticipated to Endanger Public Health and Welfare**

As set forth below, the air pollutants emitted by CAFOs constitute air pollution that endangers health and welfare. First, CAA section 111 is not limited to regulating criteria pollutants and their precursors; the EPA has the authority to promulgate performance standards for pollutants “for which air quality standards have not been issued or which are not included on a list” under section 108(a) or 112(b)(1)(A). 42 U.S.C. § 7411(d). The air pollutants emitted by CAFOs and described in the facts above meet that statutory definition of “air pollutant” under the Act. Specifically, CAFOs emit (1) greenhouse gases that cause or contribute to climate change; (2) hydrogen sulfide that cause or contribute to hydrogen sulfide exposure, localized odors, acid rain, and haze; (3) ammonia that causes or contributes to ammonia exposure, localized odors, ecosystem acidification and eutrophication, and haze; (4) PM and small particulates (PM<sub>2.5</sub>) that causes or contributes to particle pollution, acid rain, and haze; and (5) certain VOCs that cause or contribute to localized odors, ground-level ozone, and haze.

**1. CAFOs Emit “Air Pollutants” Under the Clean Air Act**

CAFOs emit these air pollutants in sufficient amounts that they “significantly cause or contribute” to the air pollution endangering public health or welfare, as set forth herein. Therefore there is no reasonable basis for the Administrator to refuse to list CAFOs under section 111, and promulgate performance standards for these air emissions from new and existing CAFOs. 42 U.S.C. §§7411(a), (b), (d).

The CAFO air emissions described in the facts above are air pollutants under the plain language of the statute and the “ordinary, contemporary, common meaning” of the term because they are emitted into the ambient air and are agents of air pollution. *Perrin v. U.S.*, 444 U.S. 37, 42 (1979), citing *Burns v. Alcala*, 420 U.S. 575, 580-581, (1975); *See Consumer Product Safety Commission v. GTE Sylvania, Inc.* 447 U.S. 102, 108 (1980) (“the starting point for interpreting a statute is the language of the statute itself”). The Act defines an “air pollutant” as an

“air pollution agent or combination of such agents, including any physical, chemical, biological...substance or matter which is emitted into or otherwise enters the ambient air. Such term includes any precursors to the formation of any air pollutant...” 42 U.S.C. § 7602(g).

Courts have generally interpreted the definition of “air pollutant” broadly. *See Alabama Power Co. v. Costle*, 636 F.2d 323, 352 Fn. 60 (D.C. Cir. 1979); *Massachusetts v. Env’t Prot. Agency* (“*Massachusetts v. EPA*”), 549 U.S. 497, 528 (2007) (Supreme Court characterized definition of “air pollutant” as “sweeping”). When Congress used expansive language in the Clean Air Act’s definition of “air pollutant,” it intended a broad grant of authority to the EPA. *Massachusetts v. EPA*, 549 U.S. at 528. The Court in *Massachusetts v. EPA* stated that “[o]n its face, the definition [of ‘air pollutant’] embraces all airborne compounds of whatever stripe, and underscores that intent through the repeated use of the word ‘any.’” *Id.* at 529.

The Coalition is asking the Administrator to look at three categories of pollutants. The first are pollutants that are already recognized under the CAA. The EPA already recognizes PM2.5 and many VOCs as air pollutants under the CAA. *See* 40 C.F.R. §§ 50.6-7. Hydrogen sulfide, while not listed under the CAA, has been previously regulated by the EPA under section 111. *See e.g.* 40 C.F.R. § 60.104 (Standards of Performance for

Petroleum Refineries). The second are pollutants that have been named as air pollutants by the EPA under the recent Greenhouse Gas endangerment finding. The EPA's recent broadly scoped Endangerment Finding defines certain greenhouse gases as "air pollutants" and "air pollution" that endangers public health and welfare. The final category of pollutants are not specifically listed under the CAA or section 111, but have long been understood to contribute to ambient air pollution because of emissions from farm animal production sites. At this juncture, the EPA may simply reference to the CAA or existing regulations when the Administrator makes a determination, in response to this petition, that CAFOs cause or contribute significantly to the air pollution from VOCs, PM, or hydrogen sulfide. Similarly, the EPA need only reference the Endangerment Finding when the Administrator makes a determination, in response to this petition that CAFOs cause or contribute significantly to the air pollution described in the Endangerment Finding. For unlisted pollutants, the Coalition requests through this petition a combined contribution, listing, and regulatory action by the Administrator. The Administrator can include her decision to list CAFOs under CAA section 111, and propose section 111 regulations at the same time, or separately.<sup>88</sup>

Furthermore, CAFO emissions comprise a significant contribution to this air pollution. The EPA has read the phrase "cause or contribute" to mean that the Administrator must "consider all sources of exposure to a pollutant (for example, food, water, and air) when determining risk."<sup>89</sup> AFOs as a whole produce 500 million tons of manure, or *3 times* the amount of waste than humans create, in the United States each

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<sup>86</sup> EPA GHG Endangerment Finding at 18888 (stating "typically, the endangerment and

<sup>89</sup> EPA GHG Endangerment Finding at 18892, citing H.R. Rep. 95- 294 at 51.

year.<sup>90</sup> Approximately 18,800 CAFOs are responsible for 47 to 60 percent of that waste.<sup>91</sup> This manure creates an alarming amount of air pollutants that contributes significantly to recognizable air pollution problems such as climate change, acid rain, haze, odors, smog, and harm to human and environmental health due to exposure.<sup>92</sup>

The major substances emitted by CAFOs plainly meet the sweeping statutory definition of “air pollutant” under section 302(g). While neither the EPA nor the courts have established a standard for determining a “significant contributor” to air pollution, the growing number of CAFOs, the startling amount of waste CAFOs can produce, and the severity of the air pollution problems associated with those pollutants evidences that CAFOs are “significant contributors” to air pollution. *National Asphalt Pavement Association v. Train*, 539 F.2d 775, 784 (D.C. Cir. 1976).

#### ***a. Greenhouse Gases***

Methane and nitrous oxide are potent greenhouse gases that contribute significantly to global warming and are “air pollutants” under the Clean Air Act. 42 U.S.C. § 7602(g). *Massachusetts v. EPA*, 549 U.S. at 528-529. The EPA agrees that these greenhouse gases “fit well within this capacious definition.”<sup>93</sup> Although it is common for the EPA to treat a class of substances with shared characteristics and a similar impact as a single pollutant,<sup>94</sup> EPA also recognizes that “[i]t is not unusual for a particular source category to emit only a

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<sup>90</sup> National Pollutant Discharge Elimination System permit regulation and effluent limitation guidelines and standards for concentrated animal feeding operations (CAFOs); Final Rule, 68 Fed. Reg. 7176-7180 (Feb. 12, 2003).

<sup>91</sup> *Id.* See also UCS Report at 2, citing M. Aillery, et. al. Managing manure to improve air and water quality; USDA Econ. Research Serv., Report No. ERR9 (2005), available at [www.ers.usda.gov/publications/ERR9/](http://www.ers.usda.gov/publications/ERR9/); see also EPA, Fact sheet: concentrated animal feeding operations proposed rulemaking (June 2006), available at [www.epa.gov/npdes/regulations/cafo\\_revisedrule\\_factsheet.pdf](http://www.epa.gov/npdes/regulations/cafo_revisedrule_factsheet.pdf) (last visited May 1, 2009).

<sup>92</sup> See generally, EPA, *Air* (Aug. 27, 2008) available at <http://www.epa.gov/ebtpages/air.html> (last visited May 1, 2009); see also Iowa CAFO Study at 45-85.

<sup>93</sup> EPA GHG Endangerment Finding at 18893.

<sup>94</sup> *Id.* at 18904. See generally EPA regulations on particulate matter and VOCs at [www.epa.gov](http://www.epa.gov).

subset of a class of substances that constitute a single air pollutant.”<sup>95</sup> CAFOs emit methane and nitrous oxide, two of the six greenhouse gases included in EPA’s Endangerment Finding.

Testing at CAFO sites show that these greenhouse gases are emitted into the ambient air from confinement, manure storage facilities, and manure disposal sites on CAFOs.<sup>96</sup> The IPCC has determined that methane is the second most important greenhouse gas and nitrous oxide is the third most important greenhouse gas that contributes to climate change.<sup>97</sup> Methane’s and nitrous oxide’s warming effects in the atmosphere demonstrate that they are “agents” of air pollution that are emitted into the ambient air. 42 U.S.C. § 7602(g). The Supreme Court has found that the scientific evidence leading to this conclusion is undeniable. *See Massachusetts v. EPA*, 549 U.S. at 528. The Court in *Massachusetts v. EPA* stated “[c]arbon dioxide, methane, nitrous oxide, and hydrofluorocarbons are without a doubt ‘physical [and] chemical...substance[s] which [are] emitted into...the ambient air.’” *Id.* (emphasis added).

Methane and nitrous oxide emissions from CAFOs significantly cause and contribute to global warming. According to the EPA, “the logical starting point for any contribution analysis is a comparison of the emissions of the air pollutant from the...category to the total, global emissions of the...greenhouse gases.”<sup>98</sup> Worldwide, the animal agriculture sector emits 18 percent of all human-induced greenhouse gas emissions, which is more than

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<sup>95</sup> EPA GHG Endangerment Finding at 18905.

<sup>96</sup> EPA Emissions from AFOs at 2-9; *see generally* Iowa CAFO Study at 89 for examples of these studies.

<sup>97</sup> U.S. National Oceanic and Atmospheric Administration, Greenhouse Gases: Frequently Asked Questions, citing IPCC, available at <http://lwf.ncdc.noaa.gov/oa/climate/gases.html> (last visited May 1, 2009).

<sup>98</sup> EPA GHG Endangerment Finding at 18906. While this statement was in relation to section 202(a) of the Clean Air Act, the legislative history of the Act shoes that the language used in 202(a) was contemplated with that of section 111 and other Act endangerment findings. *See id.* at 18891.

even the transport sector.<sup>99</sup> The Inventory of U.S. Greenhouse Gas Emissions and Sinks estimated that the agricultural sector contributed 6.4 percent of the total U.S. greenhouse gas emissions, more than any sector other than energy.<sup>100</sup>

EPA also considers in its contribution analysis a particular greenhouse gas's share of United States emissions of that pollutant. Enteric fermentation from ruminant farm animals and farm animal manure management accounted for over 16 percent of United States nitrous oxide emissions, more than all energy-related nitrous oxide emissions combined.<sup>101</sup> These activities also accounted for 27 percent of all United States methane emissions, making animal agriculture the leading source of methane emissions in the United States.<sup>102</sup> In 2006, AFOs were responsible for emitting almost 9 million tons of methane, or almost 185 million tons of carbon dioxide equivalent, in the United States alone.<sup>103</sup> Furthermore, the land disposal of animal manure is one of the two largest U.S. contributors of nitrous oxide.<sup>104</sup> These emissions are only increasing as the trend towards intensively confining greater numbers of animals in CAFOs continues to grow.<sup>105</sup>

Emissions from CAFOs therefore clearly contribute significantly to our nation's total greenhouse gases emissions. Indeed, the 10-percent increase in total domestic nitrous oxide emissions between 1990 and 2006 has been shown to be attributable in part to the poultry industry's shift from liquid manure management systems to dry systems and confinement

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<sup>99</sup> FAO Livestock's Long Shadow at 272.

<sup>100</sup> EPA GHG Inventory at 6-1.

<sup>101</sup> *Id.* at 3-1, 6-1. See also Energy Information Administration, *Emissions of Greenhouse Gases Report: Emissions of Nitrous Oxide*, available at <http://www.eia.doe.gov/oiaf/1605/ggrpt/nitrous.html> (last visited May 1, 2009).

<sup>102</sup> *Id.*

<sup>103</sup> EPA GHG Inventory at ES-13.

<sup>104</sup> *Id.* at ES-10.

<sup>105</sup> U.S. EPA Inventory of GHGs at 6-8. For example, between 1990 and 2006 in the United States, methane emissions from dairy cow and pig manure rose by 49 and 34 percents respectively.



in high-rise houses, as well as the general increase in farmed bird and pig populations.<sup>106</sup> U.S. methane emissions from agriculture increased by over 5 percent between 1990 and 2006, and emissions from animal agriculture constituted the largest percentage of this increase.<sup>107</sup> A 2008 greenhouse gas inventory in Idaho determined dairy and feedlots combined constituted one of the top greenhouse gas emitters responsible for Idaho's 31-percent increase in emissions.<sup>108</sup> These studies clearly demonstrate that CAFOs contribute significantly to the U.S. inventory of greenhouse gas emissions.

### ***b. Hydrogen Sulfide***

Hydrogen sulfide meets the definition of an “air pollutant” under the Clean Air Act because it is a toxic gas emitted into the ambient air from confinement sites and liquid manure treatment and storage facilities in CAFOs that contributes significantly to several harmful air pollution problems, including odors, unbalanced sulfur burdens and acid rain. Specifically, CAFOs emit hydrogen sulfide into the ambient air from confinement facilities with manure flushing systems, manure storage tanks, ponds, anaerobic lagoons, and land disposal sites.<sup>109</sup> Hydrogen sulfide emitted from CAFOs is a dangerous substance on its own and causes extreme odor pollution near emissions sites, contributes to regional atmospheric sulfur burdens that cause acid rain, and can contribute to PM<sub>2.5</sub> formation that causes regional haze.<sup>110</sup> The characteristic smell of hydrogen sulfide and its effects on those exposed to it and its ability to bond to other particles to create acid rain and haze make it an agent of these air pollution problems.

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<sup>106</sup> U.S. EPA Inventory of GHGs DRAFT (2001) at 6-7.

<sup>107</sup> *Id.* at 6-1.

<sup>108</sup> Randy Strait, et. al., Idaho Greenhouse Gas Inventory and Reference Case Projections 1990-2020, Idaho Department of Environmental Quality iii (2008), *available at* [www.deq.state.id.us/air/prog\\_issues/climate\\_change/pdfs/ghg\\_inventory\\_idaho\\_sp08.pdf](http://www.deq.state.id.us/air/prog_issues/climate_change/pdfs/ghg_inventory_idaho_sp08.pdf).

<sup>109</sup> U.S. EPA Emissions from AFOs at 2-11.

<sup>110</sup> *See* NRC Air Emissions from AFOs at 54-55.

While hydrogen sulfide meets the definition of an air pollutant under the plain meaning of the statute, its status as an air pollutant is also supported by EPA administrative and regulatory decisions.<sup>111</sup> Furthermore, the EPA has already recognized the need to regulate hydrogen sulfide emissions from industrial sources under section 111. Standards of performance for hydrogen sulfide exist for a variety of sources, including Sulfuric Acid Plants, Petroleum Refineries, Kraft Pulp Mills, Onshore Natural Gas Processing, and Municipal Solid Waste Landfills. See e.g. 40 C.F.R. § 60.104 (Standards of Performance for Petroleum Refineries).

CAFOs contribute significantly to the regional sulfur burdens and formation of PM<sub>2.5</sub> in areas where CAFOs are abundant or where there are few other sources of sulfur. Similarly, EPA estimates that large dairy and swine AFOs emit 100,000 pounds of hydrogen sulfide annually.<sup>112</sup> Emissions from the 2,538 U.S. facilities confining 5,000 or more pigs could reach as much as 50,000 tons of hydrogen sulfide annually.<sup>113</sup> Areas that contain these CAFOs will experience a much greater concentration of hydrogen sulfide regionally.

Generally, areas of the United States that are not exposed to industrial releases of hydrogen sulfide have airborne hydrogen sulfide concentrations of less than 1 part per billion (ppb).<sup>114</sup> In areas around Minnesota CAFOs, however, concentrations have been

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<sup>111</sup> See EPA, Animal Feeding Operations Consent Agreement and Final Order; Notice 70 Fed. Reg. 4958, 4959 (Jan. 31, 2005).

<sup>112</sup> U.S. EPA, *Non-Water Quality Impact Estimates for Animal Feeding Operations* 2-30 (2002), available at [http://www.epa.gov/npdes/pubs/cafo\\_nonwaterquality.pdf](http://www.epa.gov/npdes/pubs/cafo_nonwaterquality.pdf).

<sup>113</sup> USDA, *Farms, Land in Farms, and Livestock Operations 2007 Summary* 31 (2008); USDA, U.S. Summary and States Data, 2002 Census of Agriculture 31 (June 2004) [herein USDA 2002 Census of Agriculture]; National Response Center, Incident Report # 740450, available at [http://www.nrc.uscg.mil/reports/rwservlet?standard\\_web+inc\\_seq=740450](http://www.nrc.uscg.mil/reports/rwservlet?standard_web+inc_seq=740450), Incident Report # 743909, available at [http://www.nrc.uscg.mil/reports/rwservlet?standard\\_web+inc\\_seq=743909](http://www.nrc.uscg.mil/reports/rwservlet?standard_web+inc_seq=743909).

<sup>114</sup> Because hydrogen sulfide is naturally occurring, there are certain ecosystems, such as the Florida wetlands, with higher concentrations.

recorded as high as 50,000 ppb,<sup>115</sup> and one study found that the state standard for hydrogen sulfide concentrations were exceeded almost 5 miles away.”<sup>116</sup> In another study conducted by the University of Iowa, the dairy CAFO Milk Unlimited exceeded the recommended standard of 15 ppb six times within a single month.<sup>117</sup> This shows that the presence of CAFOs in a region significantly affects the amount of hydrogen sulfide in that area, and increases the potential for acid rain and haze.

### *c. Ammonia*

Ammonia meets the definition of an “air pollutant” under the Clean Air Act because it is a caustic gas emitted into the ambient air from any part of the CAFO that has manure present, including all confinement facilities, liquid and dry manure treatment and storage facilities, and all land disposal that is an agent of smog, haze, and ecosystem acidification and eutrophication.<sup>118</sup> On its own, ammonia is a dangerous substance with a strong odor that harms human and animal health and causes oxygen depletion and acidification of ecosystems when it is redeposited onto the land or water through precipitation.<sup>119</sup>

The Clean Air Act includes in its definition of air pollution “any precursors to the formation of any air pollutant...” 42 U.S.C. § 7602(g). Ammonia is a significant precursor to

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<sup>115</sup> *Hearing Regarding Public Health and Natural Resources: A Review of the Implementation of Our Environmental Laws, Part II Before the Senate Committee on Government Affairs*, (2002) 107<sup>th</sup> Cong., 2d Sess. (statement of Richard J. Dove, Southeastern Representative, Waterkeeper Alliance), available at <http://www.senate.gov/~govt-aff/031302dove.htm> (referring to a Minnesota study).

<sup>116</sup> Robbin Marks, Natural Res. Defense Council and Clean Water Network, *Cesspools of Shame, How Factory Farm Lagoons and Sprayfields Threaten Environmental and Public Health* 18 (2001) available at <http://www.nrdc.org/water/pollution/cesspools/cesspools.pdf> (citing *Feedlot Air Quality Summary: Data Collection, Enforcement and Program Development*, Minnesota Pollution Control Agency 12 (1999)).

<sup>117</sup> Appendix B to Letter from Michele Merkel, Senior Counsel, Environmental Integrity Project, to John Peter Suarez, Assistant Administrator, Office of Enforcement and Compliance Assurance 2 (Sept. 2, 2003), available at [www.environmentalintegrity.org/pubs/FINAL\\_CAFO\\_CAA\\_letter\\_to\\_EPA.ver\\_2\\_September\\_2\\_2003\\_.pdf](http://www.environmentalintegrity.org/pubs/FINAL_CAFO_CAA_letter_to_EPA.ver_2_September_2_2003_.pdf) [hereinafter EIP Appendix B].

<sup>118</sup> U.S. EPA Emissions from AFOs at 2-6; NRC Air Emissions from AFOs at 52.

<sup>119</sup> NRC Air Emissions from AFOs at 52.

PM2.5. Ammonia's chemical structure allows it to rapidly adhere to other particles when it is released into the air, contributing to increased formation of PM2.5, a pollutant already regulated by the Clean Air Act. 40 C.F.R. Pt. 51. In 1995, "ammonia comprised 47 percent of PM2.5 by mass in the eastern United States."<sup>120</sup> Ammonia therefore not only is an "air pollutant" in its own right, but also can be regulated under the Act as a precursor to PM2.5. 42 U.S.C. § 7602(g).

It is well-established that "ammonia emissions from the livestock sector contribute significantly to eutrophication and acidification of the environment."<sup>121</sup> Animal agriculture produced 80 percent of anthropogenic U.S. ammonia emissions,<sup>122</sup> or almost 2.5 million tons (5 billion pounds) per year, making livestock agriculture the largest industrial source of ammonia.<sup>123</sup> In 2002, the EPA documented almost 2.5 million tons of ammonia from farm animal production.<sup>124</sup> This is not surprising given that a single dairy CAFO can emit more than 5.5 million pounds of ammonia annually – 75,000 pounds more than the nation's number-one manufacturing source of ammonia air pollution.<sup>125</sup> The pig producer Premium Standard Farms reported emitting 3 million pounds annually from its Somerset facility

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<sup>120</sup> UCS Report at 55.

<sup>121</sup> NRC Air Emissions from AFOs at 52, 72.

<sup>122</sup> EPA Nat'l Risk Mgmt Research Laboratory, Review of Emission Factors and Methodologies to Estimate Ammonia Emissions From Animal Waste Handling 1 (2002), *available at* <http://www.epa.gov/ORD/NRMRL/Pubs/600R02017/600R02017.pdf>; *see also*, D. Bruce Harris, et.al., Environmental Protection Agency, Office of Research and Development, Ammonia emissions factors from swine finishing operations 1 (2001) *available at* <http://www.epa.gov/ttn/chief/conference/ei10/ammonia/harris.pdf>.

<sup>123</sup> EPA, National Emission Inventory – Ammonia Emissions from Animal Husbandry Operations, Draft Report 1-3 (2004) *available at* [http://www.epa.gov/ttn/chief/ap42/ch09/related/nh3inventorydraft\\_jan2004.pdf](http://www.epa.gov/ttn/chief/ap42/ch09/related/nh3inventorydraft_jan2004.pdf)

<sup>124</sup> *Id.* at E-4 (Table E-1).

<sup>125</sup> *Id.* at 1-3, citing EPA, Toxics Release Inventory (2003), *available at* <http://www.epa.gov/triexplorer/>. In Oregon-based 52,300-cow dairy CAFO Threemile Canyon Farms reported that its emitted 15,500 pounds of ammonia per day, which is 75,000 pounds more than reported by nitrogen and phosphate fertilizer company CF Industries. Nat'l Ass'n of Clean Air Agencies, Comment on CERCLA/EPCRA Administrative Reporting Exemption for Air Releases of Hazardous Substances from Animal Waste 3, *available at* [www.4cleanair.org/documents/CAFOLetter32708.pdf](http://www.4cleanair.org/documents/CAFOLetter32708.pdf).

alone, making it the fifth-largest industrial emitter of ammonia in the country.<sup>126</sup> While the current rate of ammonia emissions already makes CAFOs a significant contributor to total ammonia air pollution, the EPA estimates that ammonia emissions from AFOs will continue to increase.<sup>127</sup>

#### ***d. Particulate Matter***

PM<sub>2.5</sub> and PM<sub>10</sub> are already regulated under the CAA because they harm human health and contribute to “ecosystem fertilization, acidification, and eutrophication” as well as haze.<sup>128</sup> 40 C.F.R. Pts. 50.6-7. According to the EPA CAFOs emit “significant” amounts of PM<sup>129</sup> no matter what management practices are used or what type of animal confined.<sup>130</sup> Feedlot cattle emit on the order of 140 million pounds of PM<sub>10</sub> alone into the United States each year<sup>131</sup> whereas a *single* poultry CAFO can produce 1.4 million pounds of PM per year;<sup>132</sup> this is significantly over the 250 tons per year threshold to be considered a major source of PM under the Clean Air Act’s Title V. 42 U.S.C. §§ 7470-7475, 42 U.S.C. §§ 7661(a)-(f). The same poultry company had two other CAFOs at similar levels, suggesting

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<sup>126</sup> Letter from S. William Becker, Executive Director, Nat’l Ass’n of Clean Air Agencies, to The Honorable John D. Dingell, Chairman, Comm. on Energy and Commerce 2 (March 20, 2007) available at <http://www.4cleanair.org/Documents/DingellletterFINALlthd.pdf> (citing Premium Standard Farms, *Air Emissions Monitoring Completion Report* (Nov. 17, 2004) and EPA, Toxics Release Inventory (2004), available at <http://www.epa.gov/triexplorer>).

<sup>127</sup> EPA, National Emission Inventory *supra* note 121 at E-4 (Table E-1).

<sup>128</sup> *Id.* See also U.S. EPA Emissions from AFOs at 2-6; NRC Air Emissions from AFOs at 52.

<sup>129</sup> Dep’t of Justice, Ohio’s Largest Egg Producer Agrees to Dramatic Air Pollution Reductions from Three Giant Facilities (Feb. 23, 2004), available at [http://www.usdoj.gov/opa/pr/2004/February/04\\_enrd\\_105.htm](http://www.usdoj.gov/opa/pr/2004/February/04_enrd_105.htm) (last visited May 1, 2009).

<sup>130</sup> U.S. EPA Emissions from AFOs at 2-12.

<sup>131</sup> *Id.* See also USDA National Agriculture Statistics Service, *Livestock on Feed: National Statistics*, available at <http://www.nass.usda.gov/QuickStats/index2.jsp> (last visited May 1, 2009). The yearly amount of PM<sub>10</sub> was made using the CENRAP emissions factors for feedlot cattle on the USDA cattle statistics.

<sup>132</sup> Michele Merkel, EPA and State Failures to Regulate CAFOs Under Federal Environmental laws: Outline of Remarks Prepared for the National Commission on Industrial Farm Animal Production Meeting 9 (Sept. 11, 2006) available at <http://www.environmentalintegrity.org/pubs/EPA%20and%20State%20Failures%20to%20Regulate%20CAFO's%20Under%20Federal%20Environmental%20Laws.pdf>; Dep’t of Justice, *supra* note 127.

that large laying hen egg operations with similar work practices and technology are likely major sources of particulate matter as well.<sup>133</sup>

While each farm varies, the one constant in PM emission is that the larger the CAFO and the denser the animal population at the facility, the greater the contribution of PM into the ambient air. For example, the 2002 PM inventory for the Central States Regional Air Planning Association (CENRAP) revealed that CAFOs were one of two sources that comprised over 90 percent of the region's PM emissions.<sup>134</sup> These numbers alone show how the presence of CAFOs can affect the potential for PM in a region and strongly suggest that CAFOs are significant contributors to PM pollution at levels sufficient to require listing and regulation under section 111.

#### *e. VOCs*

VOCs are regulated as precursors to ozone under § 183 of the Clean Air Act. 42 U.S.C. §7511b. Within this regulation, the EPA regulates VOC emissions from 11 categories of stationary sources. *Id.* VOCs are emitted from CAFOs anywhere that manure, feed, and cattle (through enteric emissions) are present. Because of the amount of manure produced on CAFOs, they are significant sources of VOCs.

Areas with high concentrations of CAFOs are perfect illustrations of how this category of sources is a significant contributor to an area's VOC pollution. In 2005, the San Joaquin Valley Unified Air Pollution District (the District), which is an extreme ozone non-attainment area for the 1997 8-hour ozone standard, ranked farm animal waste as its

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<sup>133</sup> *Id.*

<sup>134</sup> Bryan M. Penfold, et al., Development of Agricultural Dust Emission Inventories for the Central States Regional Air Planning Association 1-7 (2002), *available at* <http://www.epa.gov/ttn/chief/conference/ei14/session7/reid.pdf>. The total PM emissions from farm animal production in the CENRAP region were estimated to be 51,000 tons per year, with 7,700 tons of PM<sub>2.5</sub> emissions within this total.

leading source of VOCs — one of the two precursors to ground-level ozone.<sup>135</sup> 40 C.F.R. § 81.305. According to the Control Officer in the District,

“[e]ven if the very low partial estimates of VOC emissions proposed by dairy industry representatives were correct...emission levels from individual dairies would still be far higher than most other individual sources of air pollution that have been successfully implementing VOC emissions controls for many years.”<sup>136</sup>

Using the District’s emissions factor of 21 pounds of VOCs per cow per year,<sup>137</sup> the approximately 9 million dairy cows in the United States<sup>138</sup> could release almost 100,000 tons (200 million pounds) of VOCs per year. Of the 71,510 facilities confining these cows, 595 confine more than 2,000 cows, putting many dairy confinement sites in the San Joaquin Valley over the 10 tons per year threshold for ozone, triggering a “major source” determination under the Clean Air Act New Source Review and Title V permitting requirements.<sup>139</sup> 42 U.S.C. §§ 7511a(e), 7602, 7661.

Odors are one of the major public complaints about CAFOs and have been linked to the presence of significant levels of VOCs. Like PM, VOCs are present with all types of animals and production methods. In Utah, people in a community north of Circle Four Farm, which houses 57,500 pigs, reported “smelling an offensive hog odor most or all of the time.”<sup>140</sup> A California community bordering Olivera, a 700,000-bird facility, complain of the

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<sup>135</sup> U.S. EPA, Ground Level Ozone (Jan. 16 2009), *available at* <http://www.epa.gov/air/ozonepollution/> (last visited May 6, 2009).

<sup>136</sup> San Joaquin Valley Unified Air Pollution Control District, Air Pollution Control Officer’s Determination of VOC Emission Factors for Dairies at 2 (2005), *available at* <http://www.4cleanair.org/Documents/APCODetermination.pdf>.

<sup>137</sup> *Id.*

<sup>138</sup> USDA 2002 Census of Agriculture at 22.

<sup>139</sup> U.S. Dep’t of Agriculture, Farms, Land in Farms, and Livestock Operations 2007 Summary, Agricultural Statistics Board (Feb.) 2008 at 22, *available at* <http://usda.mannlib.cornell.edu/usda/nass/FarmLandIn//2000s/2007/FarmLandIn-02-02-2007.pdf>.

<sup>140</sup> EIP Appendix B at 6.

inability to spend time outdoors or keep their windows open because of the smell.<sup>141</sup> In a four-month period, the Iowa State Department of Agriculture received 775 complaints about odor from dairy operations, often concerning the area's largest dairy facilities.<sup>142</sup> The presence of VOCs from CAFOs has also been linked to a significant increase in a region's PM.<sup>143</sup> These factors make CAFOs a significant source of these air pollution problems, particularly in areas with a high density of CAFOs.

## **2. Air Pollution from CAFOs is Reasonably Anticipated to Endanger Public Health and Welfare**

As discussed above, the major pollutants emitted from CAFOs have been found to significantly cause or contribute to serious air pollution problems such as climate change, ground level ozone, and acid rain. Pursuant to the requirements of section 111 of the Clean Air Act, CAFOs must be listed as a category of sources because these air pollution problems endanger public health and welfare. 42 U.S.C. § 7411(b)(1)(A). The EPA has acknowledged that the “growing scale and concentration of AFOs has contributed to negative environmental and human health impacts.”<sup>144</sup> Even if there are more opportunities for research linking negative health and environmental impacts with CAFOs, the CAA does not require absolute scientific certainty or proof of actual harm when making an endangerment finding. *Massachusetts v. EPA*, 549 U.S. at 506 n.7. The Administrator must list CAFOs and promulgate standards of performance if they “*may reasonably be anticipated*” to endanger public health or welfare. 42 U.S.C. § 7411(b)(1)(A). The EPA recognizes that the plain meaning of that phrase should “authorize, if not require, the

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<sup>141</sup> *Avila, et. al v. Olivera Egg Ranch, LLC*, Notice of Intent to Sue, Jul. 23, 2008. On file with The Humane Society of the United States, see Attach. 3.

<sup>142</sup> EIP Appendix B at 9.

<sup>143</sup> EPA, *Green Book: Criteria Pollutants*, available at <http://www.epa.gov/oar/oaqps/greenbk/o3co.html>.

<sup>144</sup> EPA, *Animal Waste: What's the Problem?*, July 2, 2007, available at <http://www.epa.gov/region09/animalwaste/problem.html> (last visited on May 1, 2009).



Administrator to act to prevent harm and to act in conditions of certainty.”<sup>145</sup> The legislative history behind that language supports the notion that Congress wanted to “assure that regulatory action can effectively prevent harm before it occurs.” See *Lead Indus. Ass’n v. Env’tl. Prot. Agency*, 647 F.2d 1130, 1152, (D.C. Cir. 1980), citing H.R.Rep.No.95-294 at 49 (1977).

The harm caused by air pollution from CAFOs is already occurring; health and environmental impacts from CAFO pollutants are well-documented. There are currently over 70 published studies linking air emissions from CAFOs to harm to public health and welfare.<sup>146</sup> There are even more studies and documentation focused on the danger of exposure to individual pollutants listed in this petition. The Supreme Court found that the EPA cannot refuse to regulate “by noting the uncertainty surrounding various features” of air pollution. *Massachusetts v. EPA*, 549 U.S. at 534. There is more than enough scientific evidence to support the claim that emissions from CAFOs clearly meet the endangerment standard.

As early as 1998, the U.S. Centers for Disease Control and Prevention stated that airborne emissions from CAFOs “constitute a public health problem” on a local, regional, and national scale<sup>147</sup> and the EPA documents specific health risks associated with exposure to CAFO emissions.<sup>148</sup> There are studies documenting instances of psychological and neurological illness<sup>149</sup>, health problems, and even death caused by exposure to emissions

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<sup>145</sup> EPA GHG Endangerment Finding at 18891.

<sup>146</sup> Kelly J. Donham, et al., *Community Health and Socioeconomic Issues Surrounding Concentrated Animal Feeding Operations*, 115 ENVTL HEALTH PERSP 2, 317-20 (Feb. 2007), available at <http://www.ehponline.org/members/2006/8836/8836.html>.

<sup>147</sup> Kendall M. Thu, Nat’l Agric. Safety Database, Neighbor Health and Large-scale Swine Production <http://www.cdc.gov/nasd/docs/d001701-d001800/d001764/d001764.pdf>.

<sup>148</sup> EPA, *Animal Waste: What’s the Problem?* (July 2, 2007), available at <http://www.epa.gov/region09/animalwaste/problem.html> (last visited May 1, 2009).

<sup>149</sup> *Id.*

from CAFOs.<sup>150</sup> The EPA includes “respiratory illness, lung inflammation, and increase[d] vulnerability to respiratory diseases, such as asthma” among the effects CAFO emissions can have on human health.<sup>151</sup> Within the facilities, up to 70 percent of CAFO workers have documented serious respiratory problems,<sup>152</sup> and similar health problems have been documented in areas surrounding CAFOs.<sup>153</sup> Children and teenagers who attend school near CAFOs may be at higher risk for asthma symptoms.<sup>154</sup> Increasing industrial animal production corresponds with an increase in local infant mortality rates: doubling animal production in a county increases infant mortality by 7.4 percent.<sup>155</sup> Clearly these substances can harm and even kill people who come in contact with them and, because most of these substances do not immediately break down in the atmosphere, their effects can spread for hundreds of miles.<sup>156</sup>

EPA itself has acknowledged that air emissions, including odors, from CAFOs can affect public welfare.<sup>157</sup> A number of studies have found that CAFO emissions are linked

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<sup>150</sup> U.S. Dep’t of Labor, Occupational Safety & Health Admin., Accident Investigation Search, available at <http://www.osha.gov/pls/imis/accidentsearch.html> (last visited May 1, 2009).

<sup>151</sup> EPA, *Animal Waste: What’s the Problem?*, July 2, 2007, available at <http://www.epa.gov/region09/animalwaste/problem.html> (last visited May 1, 2009).

<sup>152</sup> Iowa CAFO Study at 133-134.

<sup>153</sup> Iowa CAFO Study at 137. Note that similar populations that were not located near CAFOs did not demonstrate these symptoms on comparable levels.

<sup>154</sup> See Sigurdur T. Sigurdarson and Joel N. Kline, *School Proximity to Concentrated Animal Feeding Operations and Prevalence of Asthma in Students*, 129 CHEST 1, 1486-1491 (2006), available at <http://www.chestjournal.org/cgi/content/full/129/6/1486>; see also Maria C. Mirabelli, et al., *Asthma Symptoms Among Adolescents Who Attend Public Schools That Are Located Near Confined Swine Feeding Operations*, 18 PEDIATRICS 1, e66-e75 (July 2006), available at <http://pediatrics.aappublications.org/cgi/content/full/118/1/e66>.

<sup>155</sup> Stacy Sneeringer, *Does Animal Feeding Operation Pollution Hurt Public Health? A National Longitudinal Study of Health Externalities Identified by Geographic Shifts in Livestock Production* 124 (February 2009) Amer. J. Agr. Econ. 91(1).

<sup>156</sup> Agency for Toxic Substances and Disease Registry. 1999. Toxicological profile for hydrogen sulfide. Atlanta: US Department of Health and Human Services, available at <http://www.atsdr.cdc.gov/toxprofiles/tp114.pdf> (last visited May 5, 2009); see also Iowa CAFO Study at 123.

<sup>157</sup> EPA, *Animal Feeding Operations Consent Agreement and Final Order*; Notice 70 Fed. Reg. 4958, 4959 (Jan. 31, 2005).

with declines in community, quality of life, and economic stability.<sup>158</sup> CAFOs also have acute and chronic effects on farm animals' health and well-being.<sup>159</sup> A “preponderance of scientific studies on the effects of air contaminants and emissions on animal health has been conducted.”<sup>160</sup> In addition to affects on farm animals, CAFOs can affect wildlife habitat and the ability for people to enjoy wildlife. Several of the major air pollutants created at CAFOs contribute to haze and smog, which affects visibility in scenic areas and causes acidification and eutrophication of wildlife habitats.<sup>161</sup>

While evidence shows that CAFOs as a whole pose a risk to human health and welfare, each of the major emissions from CAFOs meets the endangerment standard as well. Regulating each of these emissions will not only reduce risks to human health caused by CAFOs, but will also reduce risks to health from air pollution problems to which CAFO emissions contribute.

***a. CAFO Emissions of Greenhouse Gases Endanger Public Health and Welfare***

The greenhouse gas emissions from CAFOs are associated with the gases contributing to increased temperatures on the Earth that are endangering public health and welfare. The Supreme Court found that the “harms associated with climate change are serious and well recognized.” *Massachusetts v. EPA*, 549 U.S. at 521. EPA’s recent Endangerment Finding includes six greenhouse gases, including methane and nitrous oxide, the two major greenhouse gases emitted by CAFOs.<sup>162</sup> While the Endangerment Finding explains in detail the ways that climate change is already harming our public health and welfare and “virtually every facet of the living world,” this petition describes

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<sup>158</sup> Iowa CAFO Study at 147-160.

<sup>159</sup> *Id.* at 115-120.

<sup>160</sup> *Id.* at 42.

<sup>161</sup> *Id.* at 116-117.

<sup>162</sup> See generally EPA GHG Endangerment Finding.

some of the major effects of climate change that are caused or contributed significantly to by CAFO air emissions, and that impact Coalition members.<sup>163</sup>

*(1) Harm to Public Health*

Harms come from primary and secondary sources – the increase in temperature will directly harm populations sensitive to heat-related illness in the United States while the secondary effects of climate change, such as increase of extreme weather and rising sea levels, will continue to harm public health.<sup>164</sup> In addition to contributing to the obvious dangers of global warming, exposure to methane has been known to cause acute health problems consistent with the effects of depleted oxygen and many instances of death.<sup>165</sup>

Greenhouse gas emissions, including emissions of methane and nitrous oxides by domestic CAFOs, directly endangers human health and welfare in the United States by increasing annual heat-related morbidity and mortality. There have been widespread changes in extreme temperatures over the last 50 years.<sup>166</sup> Every area of the United States is projected to experience an increase in heatwaves, with the greatest increases in the

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<sup>163</sup> *Id.* at 18904.

<sup>164</sup> IPCC Physical Science Summary at 13. An 18 to 58 centimeter rise in sea level for the 21st century, a rate that does not take into account the acceleration of ice sheet loss, would have devastating impacts on natural features, densely populated coastal communities, and fresh-water supplies.

<sup>165</sup> Since the 1970s, there are dozens of documented instances of death among CAFO workers and their families as a result of inhalation of methane gas from manure pits, including five people dying from methane exposure as recently as July 2007. *Hearing Regarding An Examination of the Potential Human Health, Water Quality, and Other Impacts of the Confined Animal Feeding Operation Industry Before the Senate Environment and Public Works Committee* (2007) 110th Cong. 2d Sess. (statement of Catharine Fitzsimmons, Chief, Air Quality Bureau Iowa Department of Natural Resources, National Association of Clean Air Agencies), *available at* [http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore\\_id=73afc323-c44d-4fff-915e-d4657b05167a](http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=73afc323-c44d-4fff-915e-d4657b05167a); U.S. Dep't of Labor, Occupational Safety & Health Administration, Safety and Health Topics: Methane, *available at* [http://www.osha.gov/dts/chemicalsampling/data/CH\\_250700.html](http://www.osha.gov/dts/chemicalsampling/data/CH_250700.html) (last visited May 5, 2009).

<sup>166</sup> EPA GHG Endangerment Finding at 18898.

western, upper midwestern,<sup>167</sup> northeastern, and southern regions.<sup>168</sup> The IPCC reports that 12 United States cities have increased hospital admissions for cardiovascular disease that had been exacerbated by hot temperatures.<sup>169</sup> Between 1979 and 1999, a time period including the 10 warmest years on record,<sup>170</sup> 8,015 heat-related deaths occurred in the United States.<sup>171</sup>

Increased temperatures also endanger public health by creating and expanding environments where diseases can thrive. Rift Valley fever, for example, reemerged in Kenya in late 2006, reportedly infecting 684 people, of whom 155 died.<sup>172</sup> Increased algae-growth due to increased sea-temperatures caused a cholera outbreak in Latin America. The IPCC estimates that the U.S. is now at risk for increased levels of cholera. In December of 2007, the first tropical virus, dengue fever, was found in Italy.<sup>173</sup> This outbreak, affecting nearly 300 people, was the first example in modern Europe of a vector-born disease that had previously only been seen in the tropics.<sup>174</sup> The reason for the spread was that climate change had created conditions that made it possible for diseases to exist

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<sup>167</sup> Kristie L. Ebi and Gerald A. Meehl, Pew Center on Global Climate Change, *Heat Waves & Global Climate Change, The Heat is On: Climate Change & Heatwaves in the Midwest* 7 (2007), available at <http://www.pewclimate.org/docUploads/Regional-Impacts-Midwest.pdf>. This study of midwestern cities showed a 21 to 50-percent increase in heatwaves over this century.

<sup>168</sup> *Id.* at 5.

<sup>169</sup> IPCC Working Group II Report Ch. 14 at 625.

<sup>170</sup> World Meteorological Organization, *WMO statement on the status of the global climate in 2007*, available at [http://www.wmo.int/pages/prog/wcp/wcdmp/documents/WMO1031\\_EN\\_web.pdf](http://www.wmo.int/pages/prog/wcp/wcdmp/documents/WMO1031_EN_web.pdf) (last visited May 1, 2009).

<sup>171</sup> Ebi and Meehl, *Heat Waves and Climate Change* at 5, *supra* note 165.

<sup>172</sup> The Humane Society of the U.S., *An HSUS Report: The Impact of Animal Agriculture on Global Warming and Climate Change* 12, *available at* [http://www.hsus.org/archive/campaigns/temp/global\\_warming\\_animal\\_ag.html](http://www.hsus.org/archive/campaigns/temp/global_warming_animal_ag.html).

<sup>173</sup> Maria Cheng, *Fever Outbreak in Italy Linked to Climate Change*, November 29, 2007, National Geographic News, available at <http://news.nationalgeographic.com/news/2007/11/071129-AP-europe-fever.html> (last visited May 1, 2009).

<sup>174</sup> *Id.*

where they could not previously.<sup>175</sup> The famous West Nile virus outbreak in the U.S. was also linked to above average temperatures.<sup>176</sup> The 0.7 degrees Celsius increase in sea-temperature has increased the growth of toxic algae which causes shell-fish poisoning.<sup>177</sup> Consumption of contaminated shellfish not only endangers humans but also sea-mammals and bird populations. The EPA has also suggested that there will likely be an increase in food-borne pathogens such as Salmonella,<sup>178</sup> which has been long associated with factory farming, because of climate change.<sup>179</sup>

Native Inupiat coastal villages in the Arctic are in imminent danger of destruction because of the severe loss of land-fast sea ice. EPA has acknowledged this imminent threat, not just to their communities, but to their way of life. “Climate change will likely interact with and possibly exacerbate ongoing environmental change and environmental pressures in settlements, particularly in Alaska where indigenous communities are facing major environmental changes from sea ice loss and coastal erosion that threaten traditional ways of life.”<sup>180</sup>

IPCC and National Oceanic and Atmospheric Administration (NOAA) research demonstrates that warmer temperatures will increase the incidence of extreme weather

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<sup>175</sup> Elisabeth Rosenthal, *As Earth Warms Up, Tropical Virus Moves to Italy*, N.Y. Times, Dec. 23, 2007, available at <http://www.nytimes.com/2007/12/23/world/europe/23virus.html> (last visited May 1, 2009).

<sup>176</sup> See generally Jonathan E. Soverow et al., *Infectious Disease in a Warming World: How Weather Influenced West Nile Virus in the United States (2001-2005)*, 117 ENVTL HEALTH PERSP. 5, (May 2009) available at <http://www.ehponline.org/docs/2009/0800487/abstract.html>.

<sup>177</sup> *Id.*

<sup>178</sup> See An HSUS Report: The Impact of Industrialized Animal Agriculture on the Environment, available at [http://www.hsus.org/farm/resources/research/enviro/industrial\\_animal\\_ag\\_environment.html](http://www.hsus.org/farm/resources/research/enviro/industrial_animal_ag_environment.html).

<sup>179</sup> EPA GHG Endangerment Finding at 18901.

<sup>180</sup> *Id.* at 18903-4.

events that can cause severe damage and loss of lives.<sup>181</sup> There were 232 tornadoes in the United States in February 2008, almost triple the previous 1971 record of 83.<sup>182</sup>

In addition to contributing to the obvious dangers of global warming, methane has been known to cause acute health problems consistent with the effects of depleted oxygen and even death.<sup>183</sup>

## (2) Harms to Natural Resources

In its recent Endangerment Finding, EPA recognizes that climate change is “already affecting U.S. water resources, agriculture, [and] land resources.”<sup>184</sup> Degradation caused by climate change, including desertification, drought, and deforestation, directly impact on global food sovereignty. This assessment is confirmed by the United Nations’ World Food Program, the Food and Agriculture Organization, and the International Fund for Agricultural Development; in December 2007 Jacques Diouf, FAO Director General stated that “[i]f we do not act now, climate change will increase the number of hungry people in the world.”<sup>185</sup> Global agricultural markets link specific impacts of climate change in one country to the ability of families across the globe to feed themselves. For example, increased global grain prices during the spring of 2008 were in part a response to decreased wheat

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<sup>181</sup> IPCC Working Group II Report Ch. 14 at 619; *see generally* Department of Commerce, NOAA’s National Climatic Data Center, CCSP, 2008: Weather and Climate Extremes in a Changing Climate. Regions of Focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research.

<sup>182</sup> National Oceanic and Atmospheric Administration’s National Weather Service, *Storm Prediction Center*, April 14, 2008, <http://www.spc.noaa.gov/climo/torn/monthlytornstats.html> (last visited May 5, 2009).

<sup>183</sup> U.S. Dep’t of Labor, Occupational Safety & Health Administration, *Safety and Health Topics: Methane*, available at [http://www.osha.gov/dts/chemicalsampling/data/CH\\_250700.html](http://www.osha.gov/dts/chemicalsampling/data/CH_250700.html) (last visited May 5, 2009).

<sup>184</sup> EPA GHG Endangerment Finding at 18899.

<sup>185</sup> World Food Program, *UN food agencies urge climate action to avert hunger*, News Release, (Dec. 12, 2007), available at <http://www.wfp.org/news/news-release/un-food-agencies-urge-climate-change-action-avert-hunger> (last visited May 5, 2009).

production from drought plagued Australia,<sup>186</sup> and recent research links this prolonged drought to global warming.<sup>187</sup>

The relationship between warming temperatures and increased soil carbon loss is well documented. Rising temperatures accelerate microbial decomposition of Soil Organic Compounds (SOCs), which enhance the release of carbon from soil into the atmosphere.<sup>188</sup> This creates a dangerous feedback loop, where increased temperatures increase carbon in the atmosphere, which again result in increased temperatures. While there is not consensus on exactly how much carbon is lost from the soil while temperatures rise, these discrepancies are likely to occur as a result of varying models on carbon soil.<sup>189</sup> A new study by scientists at the University of Toronto Scarborough found that increased warming could increase cuticular carbon in soil while decreasing other types of carbon retained in the soil. This change in the types of carbon retained in soil, particularly the loss of certain types of soil carbon, reduces the microbial activity in soil. Cuticular carbon cannot be used by soil microbes in the same way other types of carbon can. Reduced microbial activity has an adverse impact on soil fertility, reduces the ability for soil to retain water, and enhances soil erosion (which leads to desertification), all of which could have drastic impacts on agriculture and food production.<sup>190</sup>

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<sup>186</sup> Keith Bradshere, *A Drought in Australia, a global shortage of Rice*, N.Y. Times, Apr. 17, 2008, available at <http://www.nytimes.com/2008/04/17/business/worldbusiness/17warm.html?ref=science>, (last visited May 5, 2009).

<sup>187</sup> David Fogarty, *Global warming 37 pct to blame for droughts-scientist*, Reuters, Singapore, Mar., 24, 2009, available at <http://www.reuters.com/article/latestCrisis/idUSSP141565> (last visited May 5, 2009).

<sup>188</sup> See for example recent research conducted by a joint research group of the Japan Atomic Energy Agency (JAEA) and the Forestry and Forest Products Research Institute (FFPRI). For more information, please visit <http://www.jaea.go.jp/english/news/p081120/index.shtml>

<sup>189</sup> Chris Jones, et al. Global climate change and soil carbon stocks; predictions from two contrasting models for the turnover of organic carbon in soil, *Global Change Biology*, Vol. 11 No. 1 154 – 166 (2004), see Attach. 4.

<sup>190</sup> Xiaojuan Feng, et al., *Increased cuticular carbon sequestration and lignin oxidation in response to soil warming*, NATURE GEOSCIENCE Vol. 1 836 - 839 (2008), see Attach. 5.



While climate change may be reducing soil's ability to retain water and increasing erosion, it is also contributing to changes in precipitation resulting in increasing drought and desertification in some regions.<sup>191</sup> Water is already a precious commodity, and changes in precipitation are already having a severe impact on the United States and communities around the world.<sup>192</sup> Former Secretary-General of the United Nations, Kofi Annan, noted in 2001 that drought and desertification threaten the livelihoods of over 1 billion people in more than 110 countries around the world.<sup>193</sup> New research from Melbourne University found that 37 percent of droughts across the globe occurring over the last 15 years result from global warming.<sup>194</sup> The study's conductor, Peter Baines, studied global rainfall patterns and used temperature data going as far back as 1910.<sup>195</sup> The study noted that four regions of the world have already experienced decreased rainfall, including the United States and Australia.<sup>196</sup>

Climate change is a major factor in forest loss. One recent study found that forests in the Pacific Northwest are dying twice as fast as they were 17 years ago.<sup>197</sup> The study found that old growth trees were dying at a quickened pace as a result in changing water availability associated with climate change.<sup>198</sup> A 2008 U.S. Climate Change Science Program (CCSP) report observed that "[t]he number and frequency of forest fires and insect

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<sup>191</sup> See EPA GHG Endangerment Finding at 18899.

<sup>192</sup> See *id.*

<sup>193</sup> Message by the Secretary-General Kofi Annan, U.N. Convention to Combat Desertification, In Message on World Day to Combat Desertification, Warns Livelihood of 1 Billion People in 110 Countries Threatened (June 7, 2001), available at <http://www.unccd.int/publicinfo/june17/2001/anan2001.php?noMenus=1> (last visited May 7, 2009).

<sup>194</sup> David Fogarty, *Global warming 37 pct to blame for droughts-scientist*, REUTERS, Singapore, Mar. 24, 2009, available at <http://www.reuters.com/article/latestCrisis/idUSSP141565> (last visited May 1, 2009).

<sup>195</sup> See generally *id.*

<sup>196</sup> See *id.*

<sup>197</sup> Peter N. Spotts, *US Forests hold new evidence of global warming: Scientists see a trend in longer dry spells and winter snowpacks melting earlier than in the past*, THE CHRISTIAN SCI. MONITOR, Jan. 22, 2009, available at <http://features.csmonitor.com/environment/2009/01/22/us-forests-hold-new-evidence-of-global-warming/> (last visited May 1, 2009).

<sup>198</sup> See *id.*

outbreaks are increasing in the interior West, the Southwest, and Alaska.”<sup>199</sup> Warmer temperatures have contributed to “economically significant losses” in the forest resources in Alaska.<sup>200</sup> Over half of the 1.2 million tribal members in the United States have been forced to alter their traditional ways of life and economic activities because of the loss of natural resources due to warmer temperatures.<sup>201</sup> Similarly, many rural communities that depend heavily on fishing and forestry have suffered because of the decrease in those resources.

### (3) Oceanic Harms

Increased atmospheric and ocean surface temperatures harm public health and welfare. In February 2008, the Alaska Native Village of Kivalina, brought a suit because their village was eroding into the Arctic Sea due to melting sea ice. *See Native Village of Kivalina, et al. v. ExxonMobil Corp., et al.*, No. 08-1138 (N.D. Cal. Feb. 26, 2008).<sup>202</sup> Relocation is estimated to cost approximately \$400 million. *Id.* In 2005, near Indonesia, the Carterets people became the first to be officially evacuated because of climate change due to rising sea levels destroying their island homes and farms.<sup>203</sup> Harms to communities reliant on the oceans are also evident in the loss of biodiversity due to increased temperatures. Coral bleaching is particularly problematic because reefs are the most diverse oceanic ecosystem and are habitat to more than a quarter of marine life.<sup>204</sup> “[N]early 500 million people depend on healthy coral reefs for sustenance, coastal protection, renewable

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<sup>199</sup> EPA GHG Endangerment Finding at 18899 citing Backlund, P., A. Janetos, et al. Executive Summary. In: *The effects of climate change on agriculture, land resources, water resources, and biodiversity in the United States*. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research.(2008).

<sup>200</sup> *Id.*; see also IPCC Working Group II Report Ch. 14 at 624.

<sup>201</sup> IPCC Working Group II Report Ch. 14 at 625.

<sup>202</sup> See also EPA GHG Endangerment Finding at 18903.

<sup>203</sup> John Vidal, *The First Climate Change Refuges*, THE GUARDIAN, Dec. 2 2005, available at <http://www.guardian.co.uk/theguardian/2005/dec/02/guardianweekly.guardianweekly11> (last visited May 1, 2009).

<sup>204</sup> *Id.*

resources, and tourism, with an estimated 30 million of the world's poorest people depending entirely on the reefs for food.”<sup>205</sup> The Pew Center on Global Climate Change reported two studies that estimated reef-related economic contributions to four Florida counties were \$4.3 billion in sales and \$2 billion in annual income, and Hawaiian reefs provide an estimated annual benefit of \$363 million.<sup>206</sup>

Rising sea-temperature also harms aquatic habitats: more than 75 percent of major fish habitats will be affected,<sup>207</sup> including a projected 80-100 percent annual bleaching of the world's coral reefs by 2080.<sup>208</sup> There have been at least six mass coral bleaching events since 1982 because of increase sea-surface temperatures, resulting in a devastating loss of the world's coral reefs.<sup>209</sup> Coral bleaching is “incontrovertibly linked” to an increase in sea surface temperatures.<sup>210</sup>

In addition to increasing temperatures and extreme weather events, another great danger to public welfare is rising sea levels. A 16-inch rise in sea level per century, a rate that is currently being exceeded, would have devastating impacts on natural features, densely-populated coastal communities, and fresh-water supplies. An NRC report stated

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<sup>205</sup> United Nations Educational, Scientific, and Cultural Organization, *Caribbean corral reefs threatened IOC-UNESCO publication sounds the alarm*, Jan. 28, 2008, available at <http://portal.unesco.org/en/ev.php> (last visited May 1, 2009)-URL\_ID=41718&URL\_DO=DO\_TOPIC&URL\_SECTION=201.html (last visited May 1, 2009).

<sup>206</sup> Robert W. Buddemeier, et al., Pew Center on Global Climate Change, *Coral Reefs and Global Climate Change: Potential Contributions of Climate Change to Stresses on Coral Reef Ecosystems 30 (2004)*, available at [http://www.pewclimate.org/docUploads/Coral\\_Reefs.pdf](http://www.pewclimate.org/docUploads/Coral_Reefs.pdf).

<sup>207</sup> Christian Nellemann, et al., United Nations Environment Programme, *Rapid Response Assessment: In Dead Water – Merging Climate Change with Pollution, Over-Harvest, and Infestations in the World's Fishing Grounds 8-9 (2008)* [hereinafter *UNEP Fishing Grounds Assessment*], available at <http://www.grida.no/publications/rr/in-dead-water/>; see also Andrew Revkin, *Oceans' Unfruitful Stretches Multiplying*, N.Y. TIMES, Mar. 6, 2008, available at [http://www.nytimes.com/2008/03/06/us/06brfs-OCEANS8217UN\\_BRF.html](http://www.nytimes.com/2008/03/06/us/06brfs-OCEANS8217UN_BRF.html) (last visited May 7, 2009).

<sup>208</sup> UNEP Fishing Grounds Assessment at 7.

<sup>209</sup> R.J. Nicholls, et al., *Coastal systems and low-lying areas* in CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY. CONTRIBUTION OF WORKING GROUP II TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 321 (2007), available at <http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter6.pdf>.

<sup>210</sup> IPCC Working Group II Report Ch. 4 at 235.

that “[p]otentially, the greatest impact of climate change for North America’s transportation systems will be flooding of coastal roads, railways, transit systems, and runways because of global rising sea levels.”<sup>211</sup> At present, 60,000 miles of coastal highways are subject to periodic flooding.<sup>212</sup> Infrastructure such as drinking water and waste water treatment plants, sewer and stormwater management systems, airports, bridges, pipelines, communication lines, and power lines are all at risk for flooding and damage.<sup>213</sup> Of the \$19 trillion value of insured U.S. property exposed to North Atlantic hurricanes, properties worth \$7.2 trillion are located in coastal areas.<sup>214</sup>

#### *(4) Harms to the Animals and Land Habitats*

Every region in the United States is expected to suffer a loss to its local ecosystems.<sup>215</sup> If the warming trend continues, 15 to 37 percent of global plant and animal species will be extinct by 2050 because of their inability to adapt to or tolerate the increased temperatures.<sup>216</sup> A 2008 report on bird populations by the International Union for the Conservation of Nature warned that climate change accelerates the factors “which have put one in eight of the world’s birds at risk of extinction.”<sup>217</sup> Increased temperature will also

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<sup>211</sup>Nat’l Res. Council, Transp. Res. Bd., Potential Impacts of Climate Change on U.S. Transportation 146 (2008), available at <http://onlinepubs.trb.org/onlinepubs/sr/sr290.pdf>.

<sup>212</sup>*Id.* at 61.

<sup>213</sup> See EPA GHG Endangerment Finding at 18902; see generally National Research Council *supra* note 208.

<sup>214</sup> IPCC Working Group II Report Ch. 14 at 626.

<sup>215</sup> See generally, EPA, CCSP, Preliminary review of adaptation options for climate-sensitive ecosystems and resources. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research (2008) [hereinafter the U.S. CCSP Review], available at <http://www.climatechange.gov/Library/sap/sap4-4/final-report/>.

<sup>216</sup> IPCC Working Group II Report Ch. 4 at 241; IPCC Working Group II Report Ch. 14 at 624; see also Discussion § 3(b)(1).

<sup>217</sup> Press Release, International Union for the Conservation of Nature, IUCN Redlist for birds: Climate change and continental drift, available at <http://cms.iucn.org/index.cfm?uNewsID=947> (last visited May 7, 2009). The factors that contribute to the loss of bird species include, among other things, temperature changes, the long-term droughts, and extreme weather.

escalate farm animal mortality and morbidity.<sup>218</sup> A 2006 heatwave in California, for example, killed at least 25,000 cows and 700,000 chickens.<sup>219</sup> These heatwaves not only harm domestic animals, but will cause severe economic damage to the farm animal sector.<sup>220</sup> Parasites<sup>221</sup> and diseases that affect animals, such as bovine respiratory diseases and bluetongue, have been increasing as a result of rising temperatures.<sup>222</sup> Both the prevalence and intensity of these changes are expected to increase as greenhouse gas emissions continue to rise during the 21<sup>st</sup> century.<sup>223</sup>

Extreme weather events such as hurricanes have caused an estimated injury or death of 600,000 companion animals<sup>224</sup> and thousands to millions of farm animals.<sup>225</sup> Sea-temperature increase is also reducing oceanic biodiversity, including oceanic prey such as plankton, krill, fish, and squid.<sup>226</sup> This reduction will devastate marine mammals, birds, cetaceans, and pinnipeds, as well as economies reliant on these species.<sup>227</sup>

Another harm to animals will be from habitat loss due to climate change. Entire species of trees, which are critical to wildlife habitat, are suffering from problems such as shorter growing periods<sup>228</sup> and threats from invasive species.<sup>229</sup> Sea-level rise already

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<sup>218</sup> Peter Backlund et al., USDA, *The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity*, A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research 66 (2008) available at [http://www.usda.gov/oce/global\\_change/files/CCSPFinalReport.pdf](http://www.usda.gov/oce/global_change/files/CCSPFinalReport.pdf) [hereinafter USDA Report].

<sup>219</sup> *Deaths mount amid California heat*, BBC News, Jul. 29, 2006, available at <http://news.bbc.co.uk/1/hi/world/americas/5223172.stm> (last visited May 7, 2009).

<sup>220</sup> USDA Report at 65.

<sup>221</sup> U.S. CCSP Review at 5-21.

<sup>222</sup> U.S. CCSP Review at 5-21.

<sup>223</sup> IPCC Synthesis Report at 2-5.

<sup>224</sup> *House Passes Pet Evacuation Bill*, Columbia Broad. Sys. News, May 22, 2006, available at <http://www.cbsnews.com/stories/2006/05/22/politics/main1644260.shtml> (last visited May 4, 2009).

<sup>225</sup> USDA Office of Chief Economist, *A Preliminary Assessment of the Effects of Katrina and Drought on U.S. Agriculture* (Sept. 19, 2005) at 4, see Attach. 6.

<sup>226</sup> IPCC Working Group II Report Ch. 4 at 236. See also EPA GHG Endangerment Finding at 18899.

<sup>227</sup> IPCC Working Group II Report Ch. 4 at 236

<sup>228</sup> *Id.* at 227-228.

<sup>229</sup> U.S. CCSP Review at 5-20.

endangers 161 coastal wildlife refuges in the United States.<sup>230</sup> More than 50 percent of U.S. salt marsh habitat has already been lost and growing sea levels threaten remaining habitats.<sup>231</sup> Rising sea-levels also threatens developed coastal areas in the United States, which will harm urban wildlife and cause severe economic<sup>232</sup> and infrastructure loss to the public.<sup>233</sup> Droughts caused by climate change are also estimated to harm ecosystems and important habitats for animals.<sup>234</sup>

The increase in temperatures due to the anthropogenic release of greenhouse gases into the ambient air will directly harm public health and welfare and the indirect results of a warmer planet, including the spread of diseases, rising sea temperatures and levels, and droughts in sensitive ecosystems undoubtedly meet the endangerment standard as set forth by section 111 of the Clean Air Act.

***b. CAFO Emissions of Hydrogen Sulfide Endanger Public Health and Welfare***

Hydrogen sulfide emissions from CAFOs cause toxic exposures and contribute to ecosystem acidification that endanger public health and welfare. EPA itself recognizes hydrogen sulfide endangers public health and welfare.<sup>235</sup> Harms to public health and welfare come immediately in the form of direct exposure and hydrogen sulfide continues to endanger public health and welfare as a contributor to regional sulfur burdens and atmospheric acidification.

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<sup>230</sup> *Id.* at 5-3.

<sup>231</sup> IPCC Working Group II Report Ch. 14 at 623.

<sup>232</sup> *Id.* at 626. According to the IPCC report, this includes “79% of the property in Florida, 63% of the property in New York, and 61% of the property in Connecticut” in coastal areas, which are all at risk for damages from hurricanes and flooding.

<sup>233</sup> National Research Council, *supra* note 208.

<sup>234</sup> *See, e.g.*, U.S. CCSP Review at 5-3.

<sup>235</sup> EPA, *Integrated Risk Information System, Hydrogen Sulfide*, Jan. 18, 2009, available at <http://www.epa.gov/IRIS/subst/0061.htm> (last visited Feb. 7, 2009).

Hydrogen sulfide is a broad-spectrum poison, meaning that it can poison several different systems, affecting humans and animals by blocking oxygen from binding and stopping cellular respiration.<sup>236</sup> Illness from hydrogen sulfide exposure can include headaches, eye and throat irritation, toxicity in cardiovascular, gastrointestinal,<sup>237</sup> and central nervous systems,<sup>238</sup> and respiratory complications.<sup>239</sup> Hydrogen sulfide is considered immediately dangerous to life or health at 100ppm,<sup>240</sup> particularly because it causes loss in ability to smell at levels above 150 ppm,<sup>241</sup> but exposure to hydrogen sulfide can endanger human and animal health even at low levels.<sup>242</sup>

At low levels hydrogen sulfide has a rotten egg smell that is commonly responsible for the strong odors in areas local to CAFOs.<sup>243</sup> At levels higher than 150 ppm, hydrogen sulfide can cause loss of consciousness and even death.<sup>244</sup> Levels higher than 1,000 ppm have been reported at recently disturbed CAFO manure lagoons<sup>245</sup> and it is not surprising that symptoms of exposure have been routinely documented in CAFO workers and members of communities surrounding CAFOs.<sup>246</sup> There have been at least 125 OSHA-

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<sup>236</sup> Agency for Toxic Substances and Disease Registry, *Toxicological Profile For Hydrogen Sulfide*, July 2006, available at <http://www.atsdr.cdc.gov/toxprofiles/tp114.pdf> (last visited May 1, 2009).

<sup>237</sup> Agency for Toxic Substances & Disease Registry, Medical Management Guidelines for Hydrogen Sulfide (Sept. 24, 2007), available at <http://www.atsdr.cdc.gov/MHMI/mmg114.pdf> (last visited May 1, 2009); see also Marvin S. Legator et al., *Health Effects from Chronic Low-Level Exposure to Hydrogen Sulfide*, 56 ARCHIVES OF ENVTL. HEALTH. 2 125 (March/April 2001).

<sup>238</sup> Legator, *Health Effects from Chronic Low-Level Exposure to Hydrogen Sulfide*, *supra* note 234, at 126.

<sup>239</sup> *Id.* at 125-126.

<sup>240</sup> U.S. Dep't of Labor, Occupational Health & Safety Admin. [OSHA], Chemical Sampling Information: Hydrogen Sulfide (Feb 16, 2007), available at [http://www.osha.gov/dts/chemicalsampling/data/CH\\_246800.html](http://www.osha.gov/dts/chemicalsampling/data/CH_246800.html) (last visited May 1, 2009).

<sup>241</sup> Iowa CAFO Study at 124.

<sup>242</sup> *Id.* at 125. Individuals in communities exposed to hydrogen sulfide levels as low as 0.095 ppm display symptoms of exposure.

<sup>243</sup> NRC Air Emissions from AFOs at 55.

<sup>244</sup> Iowa CAFO Study at 118.

<sup>245</sup> *Id.*

<sup>246</sup> *Id.* at 125.

reported deaths from hydrogen sulfide exposure since 1984.<sup>247</sup> Clearly hydrogen sulfide exposure can create an immediate danger to the health and lives of those living near CAFOs: in June 2008, the Minnesota Department of Health asked families near the 1,500-cow Excel Dairy facility to evacuate their homes because the concentrations of hydrogen sulfide emissions from the CAFO were dangerously high.<sup>248</sup>

The same dangers from exposure to hydrogen sulfide affect mammals, birds, and aquatic life and are considered to have one of the greatest impacts on animal health.<sup>249</sup> Numerous studies have linked farm animals' exposure to hydrogen sulfide with illness, disease, and death.<sup>250</sup> Even at low levels, hydrogen sulfide is an irritant to farm animals, producing respiratory and immune system complications as well as inflammation and lesions in eye and other mucus membranes.<sup>251</sup> In higher levels, hydrogen sulfide emissions have caused large-scale die-offs in wild birds and mammals.<sup>252</sup> Local aquatic life is also endangered when hydrogen sulfide emissions are redeposited into the ecosystem. Fish exposed to hydrogen sulfide have shown gill damage that resulted in decreased respiratory function or even death.<sup>253</sup> Decreased respiratory function, caused in part by hydrogen sulfide, increases susceptibility to disease and parasites in aquatic life.<sup>254</sup>

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<sup>247</sup> See generally OSHA, Accident Search Database, available at [http://www.osha.gov/pls/imis/AccidentSearch.search?acc\\_keyword=%22Hydrogen%20Sulfide%22&keyword\\_list=on](http://www.osha.gov/pls/imis/AccidentSearch.search?acc_keyword=%22Hydrogen%20Sulfide%22&keyword_list=on)

<sup>248</sup> Tom Meersman, *Stunk out of house and home near a dairy feedlot*, STARTRIBUNE, June 9, 2008, available at [http://www.startribune.com/local/19697279.html?location\\_refer=Most%20Viewed:Homepage](http://www.startribune.com/local/19697279.html?location_refer=Most%20Viewed:Homepage) (last visited May 4, 2009).

<sup>249</sup> Iowa CAFO Study at 116-118.

<sup>250</sup> *Id.* at 118.

<sup>251</sup> *Id.* at 116-118. Low levels assumes levels higher than 10 ppm.

<sup>252</sup> David J. Hoffman, et al., *Handbook of Ecotoxicology 2* (2003).

<sup>253</sup> Marius C. B. Kiemer, et al., *The effects of chronic and acute exposure to hydrogen sulphide on Atlantic salmon (Salmo salar L.)*, 135 AQUACULTURE 4 311-327 (1995), see Attach. 7.

<sup>254</sup> See S.E. Shumway and T.M. Scott, *The effects of anoxia and hydrogen sulfide on survival, activity and metabolic rate in the coot clam, Mulinia lateralis (Say)* 71 J. EXP. MAR. BIOL. ECOL. 1 135-146 (1993), see Attach. 8.



Hydrogen sulfide also endangers public health and welfare when it works as a precursor to other pollution problems. Hydrogen sulfide is one of the principal components of the sulfur cycle that, when released in excess amounts, contributes to a region's sulfur burden and the formation of PM<sub>2.5</sub>.<sup>255</sup> These pollutants can travel for long distances to “damages trees, crops, historic buildings, and monuments” and acidify ecosystems.<sup>256</sup> The danger to public health and welfare from immediate exposure to hydrogen sulfide and its contribution to atmospheric acidification clearly meets the endangerment standard in section 111.

***c. CAFO Emissions of Ammonia Endanger Public Health and Welfare***

Ammonia emissions from CAFOs cause serious health risks associated with exposure and ecosystem acidification and eutrophication and contribute to PM<sub>2.5</sub> formation that endangers public health and welfare. EPA itself recognizes that ammonia endangers public health and welfare.<sup>257</sup> Harms to public health and welfare come immediately in the form of direct exposure and ammonia continues to endanger public health and welfare as ammonia acts as a precursor to the formation of PM<sub>2.5</sub>.

Because ammonia is rapidly absorbed into the upper respiratory system, direct exposure to even low levels of emissions can be harmful to human and animal health.<sup>258</sup> Moderate concentrations can cause severe coughing and mucus production as well as irritation of the eyes, sinuses, and skin.<sup>259</sup> Higher exposures for as little as two minutes can

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<sup>255</sup> The sulfur cycle is a process where sulfur compounds are released into the air and broken down into other chemicals, eventually to be redeposited back into the soil.

<sup>256</sup> EPA, *Six Common Air Pollutants: Chief Causes for Concern*, April 8, 2008, available at <http://www.epa.gov/air/urbanair/so2/chf1.html> (last visited May 1, 2009).

<sup>257</sup> EPA, Integrated Risk Info. Sys., *Ammonia*, Jan. 18, 2009, available at <http://www.epa.gov/iris/subst/0422.htm> (last visited May 4, 2009).

<sup>258</sup> Iowa CAFO Study at 123.

<sup>259</sup> *Id.*

result in chemical burning of the skin and eyes, permanent scarring of the upper respiratory system, and chronic lung disease.<sup>260</sup> The OSHA permissible exposure level is 50 ppm, but CAFOs regularly report concentrations higher than 100 ppm.<sup>261</sup> Exposures of 500 ppm can be fatal.<sup>262</sup>

Ammonia, like hydrogen sulfide, is one of the gases emitted by CAFOs that has the greatest impacts on animal health.<sup>263</sup> Studies of confined farm animals' ammonia exposures have documented the correlation of higher rates of reduced growth, muscle lesions, reduced functions and infections in the respiratory system, and increased risk of secondary infection, with higher ammonia exposure.<sup>264</sup> Ammonia is considered the most significant air pollutant in cattle barns and the most harmful gas in broiler chicken "grow-out" sheds.<sup>265</sup> Ammonia concentrations in CAFOs are a chronic stressor on farm animals and raise the chances of secondary infections, which increase the risks of diseased animal products reaching human points of consumption.<sup>266</sup>

Ammonia also harms ecosystems in areas where there are significant air emissions of this pollutant. Ammonia has been "identified as a major cause of soil acidification" and a cause of "eutrophication of surface water and soil" when it is redeposited from the air onto land or water bodies.<sup>267</sup> In water, eutrophication commonly results in severe reductions in

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<sup>260</sup> *Id.*

<sup>261</sup> Nat'l Inst. for Occupational Safety and Health, *NIOSH Pocket Guide to Chemical Hazards: Ammonia*, Sept. 2005, available at <http://www.cdc.gov/niosh/npg/npgd0028.html> (last visited May 4, 2009).

<sup>262</sup> Iowa CAFO Study at 124.

<sup>263</sup> Iowa CAFO Study at 117.

<sup>264</sup> *Id.*

<sup>265</sup> Iowa CAFO Study at 117-118.

<sup>266</sup> *Id.* at 117.

<sup>267</sup> EPA Nat'l Risk Mgmt Research Laboratory, Review of Emission Factors and Methodologies to Estimate Ammonia Emissions From Animal Waste Handling at 3, *supra* note 120.

water quality and oxygen levels.<sup>268</sup> Eutrophication can harm or kill sensitive plant and aquatic life populations and reduces biodiversity. On land, acidification and eutrophication can “put stress on species diversity”<sup>269</sup> and harm production of sensitive crops, including tomatoes, cucumbers, conifers, and fruit.<sup>270</sup> Acidification and eutrophication from ammonia can leave plants “more susceptible to insects and fungal infections,” drought, frost, and displacement from invasive species.<sup>271</sup>

As a precursor to PM<sub>2.5</sub>, ammonia not only harms human and animal health, but also affects visibility, causes loss of biodiversity, harms crop and commercial forest production, and destroys wildlife habitat.<sup>272</sup> The harms associated with PM<sub>2.5</sub> will be discussed below. The significant danger to public health and welfare from direct exposure to CAFO ammonia air emissions requires listing this industry under section 111.

#### ***d. CAFO Emissions of Particulate Matter Endanger Public Health and Welfare***

Particulate matter emissions from CAFOs cause toxic exposures and increases haze and smog that endanger public health and welfare. The dangers of PM emissions are well-established, and regulatory standards already exist for occupational and ambient conditions. *See* 40 CFR Pt. 51. Harms come when exposed humans and animals inhale PM, when PM creates haze, and when PM acidifies ecosystems, reducing biodiversity, visibility, and the public’s ability to appreciate outdoor areas.

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<sup>268</sup> U.S. Geological Survey, Toxic Substances Hydrology Program, *Eutrophication*, Mar. 13, 2008, available at <http://toxics.usgs.gov/definitions/eutrophication.html> (last visited May 1, 2009); *see also* Iowa CAFO Study at 42.

<sup>269</sup> *Id.*

<sup>270</sup> L.J.M. Van der Eerden, et al., *Risk of damage to crops in the direct neighbourhood of ammonia sources*, 102 ENVIRONMENTAL POLLUTION 1 49-53 (1998), *see* Attach. 9.

<sup>271</sup> EPA Nat'l Risk Mgmt Research Laboratory, Review of Emission Factors and Methodologies to Estimate Ammonia Emissions From Animal Waste Handling at 3, *supra* note 120.

<sup>272</sup> *See* generally, Facts Section of this document.

Inhalable particulates, depending on their size, can settle in the upper airways or be absorbed into the human system.<sup>273</sup> Common medical problems associated with inhaling particulates are respiratory diseases and cardiovascular irregularities in both humans and animals.<sup>274</sup> Populations with a greater incidence of long-term exposure to particulates were found to have higher rates of chronic respiratory problems, decline in lung function, and mortality from major cardiovascular diseases.<sup>275</sup> Up to 40 percent of PM<sub>2.5</sub> from CAFOs can be absorbed in human and animal systems and have generally been associated with the broad range of negative health effects listed above.<sup>276</sup> For example, 1,292 deaths occur annually as a result of current PM<sub>2.5</sub> levels in the CAFO-laden San Joaquin Valley air basin in California.<sup>277</sup> The failure to meet the 2008 PM<sub>2.5</sub> standard and the 1997 Ozone Standard in the San Joaquin Valley costs residents \$5.7 billion, most of which is the “cost” of premature deaths linked to PM<sub>2</sub> annually.<sup>278</sup> One-third of PM<sub>10</sub> emitted from CAFOs is inhalable and has been linked to asthma and bronchitis.<sup>279</sup> Respiratory problems associated with PM exposure have been documented in farm animals.<sup>280</sup>

Particulates from CAFOs contain toxins from fecal matter and fungus.<sup>281</sup> Toxins associated with CAFO PM have resulted in reduced growth, reduced functions in the respiratory system, increased nasal diseases, and even the loss of body parts from

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<sup>273</sup> NRC Air Emissions from AFOs at 55.

<sup>274</sup> EPA, *Particulate Matter, Health and Environment*, May 9, 2008, available at <http://www.epa.gov/particles/health.html> (last visited May 1, 2009).

<sup>275</sup> Iowa CAFO Study at 126.

<sup>276</sup> *Id.*

<sup>277</sup> Renee Sharp and Bill Walker, Environmental Working Group, *Particle Civics: How Cleaner Air in California Will Save Lives and Save Money* (2002).

<sup>278</sup> Jane V. Hall, et al., *The Benefits of Meeting Federal Clean Air Act Standards in the South Coast and San Joaquin Valley Air Basins* 77 (Nov. 2008).

<sup>279</sup> Iowa CAFO Study at 126.

<sup>280</sup> *Id.* at 118.

<sup>281</sup> *Id.* at 52.

fungus.<sup>282</sup> Histoplasmosis, just one of the diseases caused by fungus found in CAFO manure,<sup>283</sup> “is frequently diagnosed in farm personnel cleaning up litter and debris from poultry houses, sheds, and barns.”<sup>284</sup> In a community immediately adjacent to Heartland Quality Egg Farm in Ohio, one of several residents diagnosed with histoplasmosis was required to have a piece of his lung removed while another required leg amputation after the fungus had spread in his body.<sup>285</sup>

The presence of PM2.5 and PM10 in a region can also cause severe haze.<sup>286</sup> The EPA reports that haze from particulates has reduced visibility in the United States “from 90 miles to between 15 and 25 miles in the East and from 140 miles to between 35 and 90 miles in the West,” which creates significant losses for the public enjoyment of wildlife and wilderness areas and on tourism industries reliant on scenery.<sup>287</sup> The National Park tourism industry, which generates approximately \$14.55 billion annually, is harmed by haze because it often depends on natural views and opportunities to experience wildlife to attract visitors.<sup>288</sup> For example, the decrease in tourism in the area around the Great Smoky Mountains National Park due to loss of visibility is estimated to cost more than

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<sup>282</sup> *Id.*

<sup>283</sup> Ctrs for Disease Control & Prevention, Nat’l Ctr for Zoonotic, Vector-Borne, and Enteric Diseases, *Histoplasmosis* (March 27, 2008), available at [http://www.cdc.gov/nczved/dfbmd/disease\\_listing/histoplasmosis\\_gi.html](http://www.cdc.gov/nczved/dfbmd/disease_listing/histoplasmosis_gi.html) (last visited May 1, 2009).

<sup>284</sup> Melvin L. Myers, et al., eds., *Papers and Proceedings of the Surgeon General’s Conference on Agriculture Safety and Health* (May 3, 1991), available at [http://profiles.nlm.nih.gov/NN/B/B/W/K/\\_/mnbbwk.ocr](http://profiles.nlm.nih.gov/NN/B/B/W/K/_/mnbbwk.ocr) (last visited May 8, 2009).

<sup>285</sup> *Id.*

<sup>286</sup> NRC Air Emissions from AFOs at 72 (Table 3-7).

<sup>287</sup> EPA, *Basic Information – Visibility* (Sept. 16, 2008), available at [www.epa.gov/oar/visibility/what.html](http://www.epa.gov/oar/visibility/what.html) (last visited May 4, 2009).

<sup>288</sup> L. Bruce Hill, ABT Associates, *Out of Sight: The Science and Economics of Visibility Impairment* ES-7 (2000), available at <http://www.abtassociates.com/reports/ES-clear.pdf> (citing B. Peacock, et. al., U.S. Dep’t of the Interior, *State and National Economic Impacts Associated with Travel Related Expenditures by Recreational Visitors to Lands Managed by the U.S. Department of the Interior*, Jan. 16, 2000).

\$200 million each year.<sup>289</sup> This region of the United States includes the number two production area for hog CAFOs.<sup>290</sup> This loss is also felt by the public who wants to experience wilderness areas and wildlife in a natural habitat.

Particulates can also impact distant areas as they are carried by wind and redeposited on the ground or in water.<sup>291</sup> As discussed above, when particulates are comprised of ammonia, a common emission from CAFOs, the effects can include “making lakes and streams acidic; changing the nutrient balance in coastal waters and large river basins; depleting the nutrients in soil; damaging sensitive forests and farm crops; and affecting the diversity of ecosystems.”<sup>292</sup>

***e. CAFO Emissions of Volatile Organic Compounds Endanger Public Health and Welfare***

VOC emissions from CAFOs cause adverse health effects and contribute to haze and smog formation as a precursor to ground-level ozone and PM<sub>2.5</sub> formation. The dangers of VOC emissions to public health and welfare are well-established, and regulatory standards already exist for consumer and commercial products as well as ambient conditions for VOCs in ozone non-attainment areas. 42 U.S.C. 7511b; 40 C.F.R Pt. 59. Harms to public health and welfare come immediately in the form of direct exposure and VOCs continue to endanger public health and welfare when VOCs act as a precursor to the formation of ground level ozone and PM<sub>2.5</sub>.

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<sup>289</sup> Environmental Defense, et al., North Carolina Smokestacks Plan 5 (2001), available at [http://www.edf.org/documents/700\\_NCsmokestacks.PDF](http://www.edf.org/documents/700_NCsmokestacks.PDF).

<sup>290</sup> USDA, NASS, 2007 Census of Agriculture State Profile: North Carolina, available at [http://www.agcensus.usda.gov/Publications/2007/Online\\_Highlights/County\\_Profiles/North\\_Carolina/cp99037.pdf](http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/North_Carolina/cp99037.pdf).

<sup>291</sup> EPA, Technology Transfer Network OAR Policy and Guidance, *Health and Environmental Effects of Particulate Matter: Fact Sheet* (Jul. 19, 1997), available at <http://www.epa.gov/ttn/oarpg/naaqsfm/pmhealth.html> (last visited May 4, 2009).

<sup>292</sup> EPA, *Particulate Matter – Health and Environment* (Nov. 27, 2007), available at <http://www.epa.gov/particles/health.html> (last visited May 1, 2009).

The Iowa CAFO Air Quality Study reviewed existing research and concluded that the VOC emissions recognized “from CAFOs may well have adverse health effects.”<sup>293</sup> As stated previously, 21 of the 165 VOCs potentially emitted at CAFOs are listed as HAPs.<sup>294</sup> HAPs are pollutants “known to cause or may reasonably be anticipated to cause adverse effects to human health or adverse environmental effects.” 42 U.S.C. § 7412(b)(3)(B). The mere fact that 22 VOCs emitted by CAFOs are listed as HAPs strongly suggests that the mixture of VOC emissions from CAFOs not regulated by 112 also harm human health. Symptoms of VOC exposure from animal production include decreased immune response, increased cancer rates in animals, otolaryngological and respiratory irritation and congestion, and gastrointestinal problems.<sup>295</sup> Odors caused by VOCs also impact entire communities. Studies on the impacts of CAFOs on surrounding communities found reduction in property values and increase in violent and theft-related crimes as compared to similar populations without VOC odors.<sup>296</sup>

VOCs are regulated under the CAA because they are precursors to ground-level ozone, a “harmful pollutant” found in high levels throughout the United States and the main ingredient in smog.<sup>297</sup> See 42 U.S.C. § 7511b. Ground-level ozone and smog are throat and respiratory irritants, and can exacerbate pulmonary problems and respiratory diseases

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<sup>293</sup> Iowa CAFO Study at 129-131. (“While CAFO odors have long been recognized as a neighborhood nuisance, recent studies have suggested that odiferous exposures emitted from CAFOs may well have adverse health effects.”).

<sup>294</sup> San Joaquin Valley Unified Air Pollution Control District, Preliminary Draft Staff Report: Rule 4570 (Confined Animal Facilities) 25 (April 12, 2005), available at [www.valleyair.org/Workshops/postings/2009/03-10-09/R4570\\_StaffReport\\_SM.pdf](http://www.valleyair.org/Workshops/postings/2009/03-10-09/R4570_StaffReport_SM.pdf)

<sup>295</sup> Iowa CAFO Study at 129-131.

<sup>296</sup> *Id.* at 152-58. One study found that “[f]or every thousand hogs added in the five-mile area, [researchers] found an average drop in sale price of \$430 per property.” Another study found that “an average vacant parcel within three miles of a CAFO in Missouri lost about 6.6 percent in value, but if a parcel with a house on it was within 1/10 mile of the CAFO, it lost 88 percent of its value.” Violent crime increased by 378 percent in areas with CAFOs as opposed to a general drop in violent crime by 29 percent in other similar areas with no CAFOs. Similarly, theft-related crimes increased by 64 percent while comparable counties without CAFOs experienced a decrease of 11 percent.

<sup>297</sup> EPA, *Ozone – Good Up High Bad Nearby* (Feb. 12, 2008), available at <http://www.epa.gov/oar/oaqps/gooduphigh/bad.html> (last visited May 8, 2009).

such as bronchitis, emphysema, and asthma, effecting millions of Americans “who spend[] time outdoors in the summer.”<sup>298</sup> According to the EPA, ground-level ozone “leads to reduced agricultural crop and commercial forest yields, reduced growth and survivability of tree seedlings, and increased susceptibility to diseases, pests and other stresses such as harsh weather.”<sup>299</sup> The effect of this damage is that ground-level ozone causes an estimated \$500 million in reduced crop production each year.<sup>300</sup> Furthermore, ground-level ozone can damage the foliage of trees that are crucial to wildlife habitat.<sup>301</sup>

### **C. The Administrator Must Exercise Her Authority under Section 111 to List and Promulgate Performance Standards for CAFOs**

CAFOs contribute significantly to air pollution which may reasonably be anticipated to endanger public health or welfare.<sup>302</sup> 42 U.S.C. § 7411(b)(1)(A). CAFOs meet the definition of a stationary source under the Act, and therefore are eligible for listing under section 111.<sup>303</sup> See 42 U.S.C §§ 7411(a)(3), (b)(1)(A). The CAA, moreover, is a precautionary statute and “demand[s] regulatory action to prevent harm, even if the regulator is less than certain that harm, is otherwise inevitable.” *Ethyl Corp. v. EPA*, 541 F.2d 1, 25, (D.C. Cir. 1976). Specifically, the 1977 Amendments to section 111 were designed to “emphasize the precautionary or preventative purpose of the act (and, therefore, the Administrator’s duty to assess risks rather than wait for proof of harm).”<sup>304</sup>

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<sup>298</sup> *Id.*; see, e.g., EPA, Smog—Who Does It Hurt? What You Need to Know About Ozone and Your Health (July 1999), available at <http://www.epa.gov/airnow//health/smog.pdf>; see also discussion at subsection 3a(2)-(5).

<sup>299</sup> EPA, *Ozone – Good Up High Bad Nearby*, *supra* note 293.

<sup>300</sup> *Id.*

<sup>301</sup> *Id.*

<sup>302</sup> Many peer-reviewed scientific studies have been performed on emissions from CAFOs, contributing to an understanding of what and how much is being emitted by these operations. See, e.g., Iowa CAFO Study at 48, 61 (housing unit emissions); 54 (manure storage); 65-6 (land disposal).

<sup>303</sup> See *supra* section IV. A.

<sup>304</sup> H.R. Rep. 294, 50-51 (1977) (amendments are designed to “emphasize the precautionary or preventive purpose of the act (and, therefore, the Administrator’s duty to assess risks rather than wait for proof of actual harm)”).



Because of the serious consequences caused by emissions from CAFOs, it would be unreasonable for the Administrator not to take immediate action to regulate CAFO emissions under section 111.

Once the Administrator finds that CAFOs contribute significantly to air pollution that endangers public health or welfare, no discretion exists as to whether or not she must regulate such emissions from this industry, under CAA section 111. *Nat'l Res. Def. Council, Inc. v. Train*, 411 F.Supp. 864, 868 (S.D.N.Y. 1976). Because of the large amounts of dangerous pollutants from CAFOs as a whole, like other categories of stationary sources regulated under section 111, there can be no reasoned explanation for the EPA to refuse to list them as a category of sources under section 111. "A long line of precedent has established that an agency action is arbitrary when the agency offered insufficient reasons for treating similar situations differently." *Transactive Corp. v. U.S.*, 91 F.3d 232, 237 (D.C. Cir. 1996); *see also Indep. Petroleum Ass'n of Amer. v. Babbitt*, 92 F.3d 1248, 1258 (D.C. Cir. 1996) ("An agency must treat similar cases in a similar manner unless it can provide a legitimate reason for failing to do so."). The EPA's refusal to list CAFOs as a category of stationary sources under section 111 would be an arbitrary and capricious approach to the regulation of greenhouse gas emissions and other air pollution problems.

Furthermore, the existence of the AFO Air Compliance Agreement ("the Agreement") is not a defensible reason to refuse to list CAFOs under section 111. The Agreement only gives AFOs *who signed it* immunity from liability under Parts C and D of Title I, and section 111 falls into Part A of Title I.<sup>305</sup> *See* 42 U.S.C. §§7401-7431. The Agreement is merely a voluntary contract between EPA and qualifying AFOs: there is no

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<sup>305</sup> Animal Feeding Operations Consent Agreement and Final Order, 70 Fed. Reg. 4,958 (Jan. 31, 2005).

blanket immunity for AFOs as a whole.<sup>306</sup> Furthermore, the Agreement only grants immunity from civil violations under permitting requirements under the State Implementation Program or of Title I, Parts C and D and Title V of the Act, which does not impede this petition. The Coalition asks the Administrator to move forward to list this industry under CAA section 111, based on currently available scientific data demonstrating that CAFO emissions contribute significantly to the air pollution EPA has recently stated endangers public health and welfare.<sup>307</sup> Additionally, the Administrator must issue new and existing CAFO performance standards.

### **1. Using Section 111 to Regulate Air Pollutant Emissions from CAFOs Is Effective and Feasible**

It is possible to achieve drastic reductions in air pollution emissions from CAFOs using the authority given to the Administrator in promulgating performance standards for CAFOs. Section 111(h)(1) of the CAA defines the technologies in a new source performance standard as including “design, equipment, work practice or operational standard[s].” 42 U.S.C. §7411(h)(1). Case law as well as the 1990 legislative history to the CAA supports the notion that pollution reduction can be achieved through a variety of means and is not limited to end-of-pipe controls.<sup>308</sup> The factors affecting CAFO emissions are understood and many are controllable, such as whether waste storage conditions are aerobic or anaerobic; the diet fed to the animals; the pH of the manure; and time and temperature of animal waste in storage.<sup>309</sup> Promulgating standards of performance for CAFOs that address these factors would result in easily achieved and substantial reductions in emissions. For factors

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<sup>306</sup> *Id.*

<sup>307</sup> *See generally* EPA GHG Endangerment Finding.

<sup>308</sup> U.S. EPA Emissions from AFOs at 2-14; *See generally, State of New York v. Reilly*, 969 F.2d 1147 (D.C. Cir. 1992), (municipal incinerators may use work practices to control incineration pollution); S. Rep. 228, 291.

<sup>309</sup> U.S. EPA Emissions from AFOs at 2-14.

that cannot be reduced through work practices, there is demonstrated technology to capture and reduce emissions.<sup>310</sup> In addition, “[r]elatively accurate but inexpensive instruments” exist for measuring the major CAFO pollutants to determine what controls are needed.<sup>311</sup>

Simple work practice changes, such as reducing the time between surface application of manure and incorporation into soil, ensuring proper soil drainage, ensuring adequate oxygen exposure to stockpiles or irrigating directly after application, can significantly reduce emissions. For example, CAFO operators can reduce PM from open lots simply by removing manure from the lots more frequently.<sup>312</sup> The length and position of feed delivery technology can reduce PM emissions from feed boxes.<sup>313</sup> Planting buffer strips around CAFOs could trap many gases and particles and prevent them from being redeposited in other areas.<sup>314</sup> Furthermore, using techniques that reduce PM inside buildings where animals are housed also improve animal performance and reduce disease transmission between animals and workers.<sup>315</sup> Switching from farm animal production systems reliant on feedcrops like grain and soy to pasture-raised, organic, or full cycle farming systems can result in less methane, ammonia, and nitrous oxide emissions<sup>316</sup> and is potentially or likely more cost-effective because it requires less inputs, maintenance, and

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<sup>310</sup> See, e.g., Iowa CAFO Study at 205.

<sup>311</sup> Bryan Bunton, et. al., *Monitoring and Modeling of Emissions from Concentrated Animal Feeding Operations: Overview of Methods*, 115 ENVTL. HEALTH PERSPECT 2 303-307 (February 2007) (inexpensive is defined as >\$10,000), see Attach. 10.

<sup>312</sup> B. Auverman, et al., Nat’l Ctr. for Manure and Animal Waste Mgmt. and Midwest Plan Services, *Particulate Matter Emissions from Confined Animal Feeding Operations: Management and Control Measures* (2001) 21-25, see Attach. 11.

<sup>313</sup> *Id.*

<sup>314</sup> *Id.*

<sup>315</sup> *Id.* at 20.

<sup>316</sup> Cattle raised on pasture, eating a more natural, low-energy diet composed of grasses and other forages, may produce manure with about half of the potential to generate methane. EPA GHG Inventory at 5-5.

energy at the facility.<sup>317</sup> If simple regulations were made to normalize management practices, a significant reduction in emissions could be achieved.

There are currently demonstrated control technologies that are commercially available and technologically and economically viable. In a 2006 Department of Agriculture study at major pig confinement facilities, a switch from a traditional anaerobic lagoon/spray irrigation technique to a new treatment method using a dual wastewater treatment and manure composting systems resulted in a 96.9 percent reduction in GHG emissions at a benefit of \$4.59 per finished pig.<sup>318</sup> Other studies showed that installing simple filters in ventilation and recirculation systems reduced hydrogen sulfide emissions by 80 to 90 percent and ammonia emissions by 50 to 60 percent.<sup>319</sup>

Using section 111 to regulate CAFOs is also necessary because a national approach to CAFO regulation would be more effective than the existing regulatory approach. The current lack of EPA oversight has resulted in inadequate and inconsistent state and local regulation. Existing state and local regulations for CAFOs are inadequate to ensure that emissions from CAFOs are not endangering public health or welfare because they do not reduce greenhouse gas emissions or meet rigid enough standards to protect public health and welfare. For example, only 10 states have set emissions standards for hydrogen sulfide, all of which vary greatly.<sup>320</sup> Even in states that have standards, they often do not meet the recommended guidelines set for ambient exposure limits for hydrogen sulfide by the EPA

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<sup>317</sup> UCS Report at 3, 54.

<sup>318</sup> Matias B. Vanotti et al., *Greenhouse gas emission reduction and environmental quality improvement from implementation of aerobic waste treatment systems in swine farms*, 1 WASTE MGMT 28 759-766, 765 (2008) (the economic benefit counts a carbon credit to the facility), see Attach. 12.

<sup>319</sup> Iowa CAFO Study at 205.

<sup>320</sup> *Id.* at 72.

and the Agency for Toxic Substances and Disease Registry.<sup>321</sup> A national approach to establishing these regulations and emissions standards is necessary because every state in the United States has farm animals raised in confinement and almost every state has AFOs with more than 300 animals.<sup>322</sup> Setting federal guidelines and performance standards for CAFOs will minimize risks to public health and welfare by creating consistent emissions limitations at levels that ensure safety.

While best available technology is continually being updated, the technology has demonstrated results sufficient enough to set standards. Courts have routinely agreed that “adequately demonstrated” does not mean that the facilities must already be capable of achieving standards, but rather that “[s]ection 111 looks toward what may fairly be projected for the regulated future, rather than the state of the art at present...” *Portland Cement Ass’n v. Ruckelshaus*, 486 F.2d 375, 391 (D.C. Cir. 1973). The field technologies discussed above can already provide a significant reduction in CAFO emissions while new technologies are being developed. For example, the EPA notes that the poultry industry is the largest contributor to the country’s ammonia emissions (27 percent in 2002), and there are already field-tested technologies that provide up to 50 percent reductions in ammonia emissions from poultry CAFOs.<sup>323</sup>

Demonstrated and tested technology is already available for commercial use. Techniques such as acidification of manure can suppress ammonia formation by up to

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<sup>321</sup> Agency for Toxic Substances and Disease Registry, *Health Consultation: Mountain View Sewer Gas Investigation Scottsdale Maricopa County Arizona* (2003), available at [http://www.atsdr.cdc.gov/HAC/pha/mountainview/mou\\_p1.html#healthb](http://www.atsdr.cdc.gov/HAC/pha/mountainview/mou_p1.html#healthb) (last visited May 8, 2009).

<sup>322</sup> Claudia Copeland, Congressional Research Service, *Air Quality Issues and Animal Agriculture: A Primer*, CRS-7 28-29 (2007), available at <http://digital.library.unt.edu/govdocs/crs/permalink/meta-crs-8641:1>, citing USDA 2000 Manure Nutrients Report.

<sup>323</sup> United Egg Producers, Application for an NRCS Conservation Innovation Grant, 1, see Attach. 13.

70%.<sup>324</sup> Swine and poultry AFOs have successfully employed this method in the past.<sup>325</sup> Biofilters, consisting of microbes in some organic media, have been proven to remove 50 to 83% of ammonia and 80 to 86% of hydrogen sulfide from facility air before it is released to the ambient environment.<sup>326</sup> In combination, some of these management practices (e.g., diet, enzyme additives, and injection) may significantly reduce overall emissions at CAFOs. Moreover, with facility-specific emissions data, mitigation techniques can be deployed in a more precise manner to eliminate the higher priority emissions.

As discussed in section III(A), the number of CAFOs and the air pollution emitted by them is steadily increasing. Promulgating standards for these sources now will help ensure that harms to public health and welfare from CAFOs will not increase. It is for these reasons that the EPA should regulate CAFOs to ensure that mitigation technologies are being utilized and have a net benefit for human health and welfare, the environment, as well as producers. In Iowa, for example, methane capture would only have to be used on the largest manure storage facilities (CAFOs with 5,000 or more animals) to reduce their collective emissions by 700,000 tons of carbon dioxide equivalent per year, or 1% of the total U.S. greenhouse gas emissions from reducing emissions in just one state.<sup>327</sup> There is more than enough information and tested emissions reduction technology for the Administrator determine that CAFOs contribute significantly to the air pollution EPA already has found endangers public health and welfare, and to list the CAFO industry, and promulgate new and existing source performance standards for it.

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<sup>324</sup> U.S. EPA Emissions from AFOs at 9-18.

<sup>325</sup> *Id.* at 9-18.

<sup>326</sup> *Id.* at 9-20.

<sup>327</sup> See generally R.A. Ney et. al., Ctr. for Global and Regional Env'tl Research, Univ. of Iowa, Iowa greenhouse gas action plan (1996), available at [www.cgrer.uiowa.edu/research/reports/iggap/finalgg3.PDF](http://www.cgrer.uiowa.edu/research/reports/iggap/finalgg3.PDF).

## VI. CONCLUSION

Mitigating the animal agriculture sector's significant yet underappreciated role in climate change and other air pollution problems is vital for the health and sustainability of the planet, the environment, and its human and nonhuman inhabitants. The negative impacts from CAFO emissions are already occurring and will only worsen as the trend toward concentrated farm animal production continues to increase. Scientific consensus supports immediate listing of CAFOs and the issuance of new source performance standards for the industry. The farm animal production sector is the largest contributor of ammonia, and is a major contributor of hydrogen sulfide and VOCs, as well as being responsible for more GHG emissions than the transportation sector. Because CAFOs, specifically, contribute to such a large portion of the farm animal production sector air emissions, regulating this industry is entirely justified. Based on the information contained in this petition, it is unreasonable for the Administrator not to determine that CAFOs contribute significantly to air pollution that endangers public health and welfare. The Administrator also must list CAFOs under section 111 and promulgate standards for new, modified, and existing CAFOs.

Respectfully Submitted,

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