Appendix G. *The American Lung Association (ALA) published a piece on Confined Animal Feeding Operations — October 2006.*

The ALA does not have a specific position on confined animal feeding operations. However, the research to date gives reason to be concerned about the impacts of such facilities on children's lung health.

While the evidence on the impact to children is limited, one study published in the journal Pediatrics in June 2006 found an association with increased wheezing in teens with asthma who were in schools within 3 miles of a large hog farm. This study has many limitations, but it indicates that there may be additional risks associated with children with allergies, particularly where there was a strong odor. These same researchers published a study in Environmental Health Perspectives that found, not surprisingly, that low income and non-white populations more often lived closer to these facilities than higher income, predominantly white populations. People of color and low income populations tend to suffer the burdens of asthma in greater proportions, so the impact of such facilities might be greater on those communities. Another study this year in the Journal of Environmental Hygiene looked at the possible spread of bacteria from the lots and found that the bacterial plume settled within 200 meters (213 yards) of the edge of the lots, indicating that the bacteria might not be a problem at a distance of 2 miles. Much of the work on the health effects of breathing air from CAFOs has concentrated on the health of workers and less on the neighbors, though that research is growing. A 2002 review of the science to that point noted that the type of health effects suffered by neighbors tended to be similar to those documented by workers.[1]

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[1] **The specific studies noted are cited below.**

Asthma symptoms among adolescents who attend public schools that are located near confined swine feeding operations. Mirabelli MC, Wing S, Marshall SW, Wilcosky TC. *Pediatrics*. 2006 Jul;118(1):e66-75.

Race, poverty, and potential exposure of middle-school students to air emissions from

Appendix H: *June 6, 2008 Memo to Lisa Hanson, ODA, from David Collier, DEQ Air Quality Planning, regarding Ammonia and Regional Haze*

State of Oregon
Department of Environmental Quality Memorandum

To: Lisa Hanson, ODOA **Date:** June 6, 2008

From: David Collier, Manager
Air Quality Planning

Subject: Ammonia and Regional Haze

Dear Lisa,

You recently asked about the percent of CAFO ammonia that contributes to haze in the Gorge. There is no single or simple answer to that question. The contribution of agricultural ammonia to Gorge and regional haze varies significantly, day-to-day, season-to-season depending on many factors. As you know, estimates of haze impacts are driven largely by our estimates of emissions, and our current emission estimates are only accurate enough for a general, regional characterization of haze impacts from all ammonia sources. We trust EPA's CAFO emissions study will greatly improve our emission estimates and our understanding of the role CAFO ammonia plays in haze.

Below is an overview of the role of ammonia in regional haze (which includes Gorge haze issues) and some points about the role of agricultural ammonia. I

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confined swine feeding operations. Mirabelli MC, Wing S, Marshall SW, Wilcosky TC. *Environ Health Perspect*. 2006 Apr;114 (4):591-6.

Bacterial plume emanating from the air surrounding swine confinement operations. Green CF, Gibbs SG, Tarwater PM, Mota LC, Scarpino PV. *J Occup Environ Hyg*. 2006 Jan;3 (1):9-15.

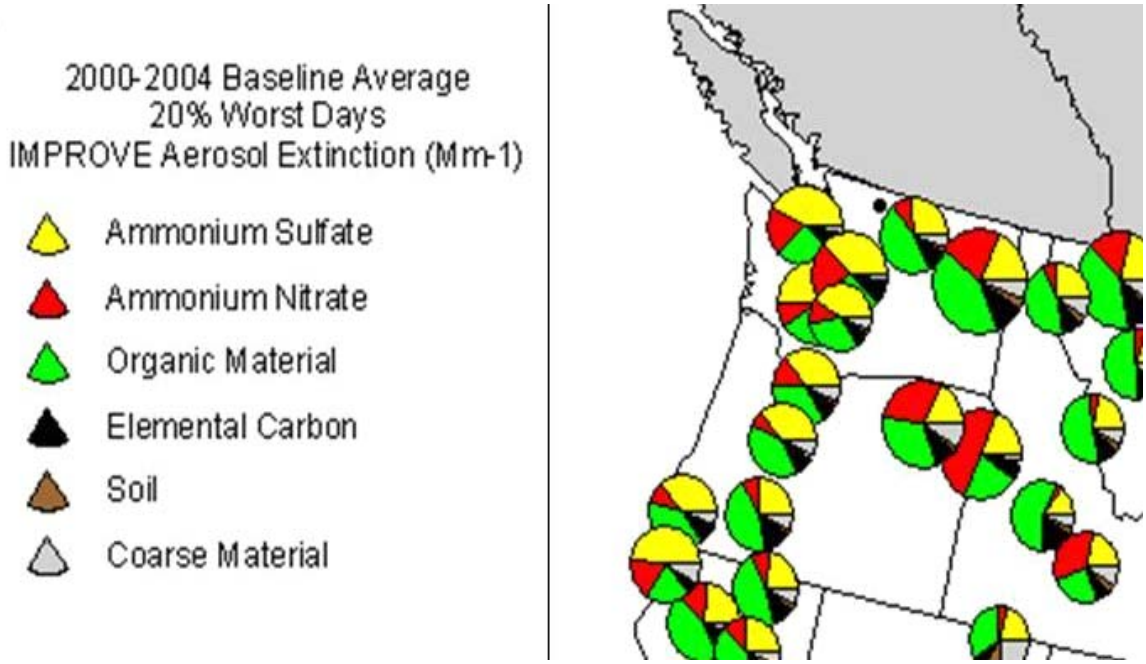
Public health concerns for neighbors of large-scale swine production operations. Thu KM. J Agric Saf Health. 2002 May 8 (2):175-84.

hope it can help answer your Board's basic questions. I've included some links to our Dairy and Gorge project websites where they can find more detailed technical information if they wish.

As we've discussed in the Dairy Task Force, haze pollution in the Gorge, across the Pacific Northwest, and across the county is caused chiefly by four things: carbon (i.e. organic carbon-smoke, and elemental carbon-soot), ammonium sulfate, and ammonium nitrate particles. On any given day, at any given location, the relative percent contribution of these pollutants can vary significantly depending on the amount of each compound in the air (i.e. the amount of ammonia, sulfur dioxide, oxides of nitrogen, smoke, etc.), as well as wind direction and speed, temperature, humidity, and a number of other factors that influence the complex air chemistry that forms haze. Figure 1 below is taken from our presentation to the Dairy Task Force and shows the general relative influence of carbon, nitrate, and sulfate haze across the Pacific Northwest on hazy days.

Figure 1

Northwest regional haze on days when visibility is the worst.
2000-2004



At this point in time, we know generally that total regional ammonia plays a key role in the formation of haze pollution. That's just part of the basic chemistry of sulfate and nitrate formation. As we've discussed, the state of science today is such that we can not estimate with certainty the relative contribution of individual ammonia sources such as dairies, other CAFO's, farmland fertilizer use, or transportation. That work will evolve as we get better emission estimates in the next several years through EPA's CAFO emissions modeling project. We can however estimate general regional emissions for the purpose of evaluating general regional haze estimates. We recognize the current uncertainties in these estimates and that they should not be used to reflect individual farm contributions.

An initial look at the question of agricultural ammonia and haze was done as part of the recent Columbia Gorge Haze study. The technical work from that study can be found at the project website. For those wishing more detail, the Science Summary Report is a good place to start. http://www.deq.state.or.us/aq/gorgeair/scienceday.htm

The Gorge study uses a computer model to simulate the complex chemistry and transport of haze. The modeling tool can be used to test different hypothetical changes, like reduction in different emissions, to see what the effect on haze could be. A test was run was conducted where all regional (Oregon and Washington) CAFO ammonia was removed to see what the effect would be. For this exercise, regional CAFOs included dairy, beef, poultry, and goat operations.

An episode of several consecutive worse-case winter haze days was run in the model. Not surprisingly, the results suggest that total (OR and WA) CAFO ammonia can contribute very little to haze on some days, and as much as 12% to 30% of total haze impacts on other days. The results also suggest that reducing ammonia can produce a significant improvement in haze. The Gorge visibility study is not definitive, and only goes so far in illustrating the role of CAFO ammonia in Gorge and regional haze. It gives us an initial sense of the role regional ammonia plays in haze impacts, and the potential benefits from ammonia reduction. It also illustrates the current technical complexity and uncertainties of evaluating this issue.

In addition to visibility, the U.S. Forrest Service has been researching acid deposition in the Columbia Gorge National Scenic Area and the potential threat to ecosystem and cultural resources. We do not know at this time what role ammonia may play in the formation of acidic air pollutants.

What's the current state of knowledge?

- We know enough to say that regional ammonia plays an important role in haze formation, and our initial investigations suggest ammonia reductions from a variety of sources would help reduce haze pollution.

- We need better emission estimates for all ammonia sources, especially EPA's CAFO emissions study, so we can increase the certainty of our information and understanding. More definitive analysis will be developed in the coming years.

- We know enough today to take initial and incremental actions to begin reducing ammonia from CAFOs over the long-term. The recommendations of the Dairy Task Force can provide a good model for how to equitably approach this issue.

Again, more detailed information and analysis can be found at several locations:

PowerPoint presentation that was presented to the Dairy Task Force by way of background. See, http://www.deq.state.or.us/aq/dairy/docs/columbiaRiverGorgevisibility.pdf.

More information about the Gorge visibility analysis and emission reduction testing can be found at the project's website noted previously and at: http://www.deq.state.or.us/aq/gorgeair.

I hope this overview was helpful.

Sincerely

David Collier, Manager
Air Quality Planning

(503) 229-5177
collier.david@deq.state.or.us