

MARYLAND DEPARTMENT OF THE ENVIRONMENT

RESPONSE TO COMMENTS

CONCERNING THE DEPARTMENT'S PROPOSED AMBIENT AIR MONITORING PROJECT ON THE
LOWER EASTERN SHORE OF MARYLAND

Comment: This message is to voice my support for the Community Healthy Air Act or CHAA. I feel obligated to strongly support this as a result of my personal experience both as a lay person but more importantly as a board-certified practicing physician practicing medicine over 45 years. My clinical experience in medicine is emergency and urgent care which involves treatment of many respiratory issues with patients presenting acutely with asthma, bronchitis, sinusitis etc. I have practiced in several States and regions in the United States as well as Canada and European countries. Over the years that I have been here on the Eastern Shore I have been amazed by the high numbers of patients presenting with acute and chronic respiratory illnesses as compared to other areas of the United States, Canada and Europe where CAFOs are nonexistent and I have practiced there.

I feel that air quality is a big contributor as the etiology to the cause of these respiratory illnesses. Specifically, I find an unprecedented concentration of Concentrated Animal Feeding Operations, particularly Mega chicken houses with no regard to density of placement and concentration within a small geographical area. The discharge of noxious gasses, particulate matter and respiratory irritants are surely contributing in my opinion to these increased amounts of respiratory illnesses that I have experienced in my practice.

Reliable air quality monitoring must be established by independent Scientific professionals. Medical studies are insignificant and unreliable when there is any influence from outside supporters. One or Two monitoring stations are statistically insignificant and not valid scientific evidence. Monitoring needs to be done from multiple different sites and areas of varied concentration of CAFO activity and density. The poultry industry has no place to be dictating to the scientific community how to conduct scientific studies.

Signed Joseph J. Inzerillo, MD, ABFM, co-signed Lisa Inzerillo (Backbone Road, Princes Anne), Kathy Phillips (Director, Assateague Coastal Trust) and Mary Ashanti (RN, President Wicomico County NAACP)

Response: Implementing the provisions of the Community Healthy Air Act (CHAA) is not the focus of the Department's monitoring project. As stated at the public meeting and in writing, this study is a first step in looking at the potential health impacts associated with poultry operations. The CHAA, unlike the Department's effort, is a study to quantify emissions from all major poultry operations and to then assess the potential public health impacts directly associated with those emissions. Rather, this project has a limited scope, which is to gather data on the levels of ammonia and

particulate matter in the air near a concentration of poultry houses and to compare the collected air quality data to data gathered from two other locations not on the lower eastern shore. The specific concentration of poultry houses to be selected, in the Department's eyes, is to be one that is neither the worst-case scenario (numerous poultry houses in very close proximity to residents) nor the most benign scenario (minimal poultry houses not near residents), but one that would provide data on air quality that represents what the majority of residents on the lower eastern shore are breathing. We believe the information that will be provided by the Department's project has value and needs to be pursued.

A significant hurdle for the CHAA is that the Maryland Department of the Environment does not have the legal authority to sample air quality on private property to either quantify or characterize emissions. Any attempt to quantify or to characterize emissions through physical measurement means would need to be undertaken beyond a grower's property line. The further away air sampling takes place from the source of the emissions, the less accuracy there is with respect to any measurement taken being a true quantification of those emissions. As the distance from the emission source lengthens due to property line distances, the exercise of quantifying emissions gets further from what the CHAA envisioned and gets closer to the design of the Department's current project.

The Delmarva Poultry Industry, Inc. (DPI) is not dictating how MDE is to conduct a scientific study. DPI is a partner who, like MDE, is interested in knowing whether their industry has an adverse health impact on the residents of the lower eastern shore. DPI is providing funding for the two background ammonia monitors and has provided MDE with contact information of any growers who have property identified by MDE as a potential monitoring site. MDE has gone to great lengths to ensure that MDE is the technical lead and, thus, is solely responsible for selecting locations for the monitors, gathering all data and interpreting results. Neither DPI, nor the Campbell Foundation has a say in any of these elements of the project. All parties involved in the partnership effort have agreed to this.

Comment: On behalf of ACT's (Assateague Coastal Trust) Board of Directors and our 2,000 members we wish to make it known it is troublesome to have a state regulatory agency, that is charged with protecting the public's health and the health of our ecosystems, enter in to a Memorandum of Understanding (MOU) that includes a financial agreement between the state and a polluting industry your agency is responsible for overseeing. We are disappointed the State did not recognize the perceived irregularity of this arrangement and instead might have worked to find solutions to the air quality concerns of Lower Shore communities by engaging directly with these communities a year ago, or even over the past three years as they struggled to enact the Community Healthy Air Act.

The introduction in the MOU cites:

"[T]here have been claims that air quality within some communities in rural areas is unhealthy due to concentrated animal feeding operations (CAFO's) involving poultry and, more particularly, that

ammonia and particulate emissions from poultry houses adversely affect health illnesses, such as asthma... [but] the lack of monitoring stations on the lower Eastern Shore in the vicinity of poultry operations does not allow for a scientifically-based approach to determining any potential link between poultry operations on the lower Eastern Shore and adverse health effects.”

It is reassuring to see that MDE recognizes the underlying problem, a lack of any air quality monitoring stations on the Lower Shore. Unfortunately, the air quality monitoring project outlined within the MOU is limited by mutual agreement to do nothing more than collect data and the public informational meeting on April 25 did not adequately address either in the presentation or during the Q&A the exact “scientifically-based approach to determining any potential link between poultry operations on the lower Eastern Shore and adverse health effects.” Indeed, the MDE project is, by agreement, not be used in a manner that would assess public health impacts or lead to regulation or policy decisions. During the April 25 public informational meeting, you could not answer citizen questions about what MDE will do with the data once it is collected. By the very nature of this “Ambient Air Quality Monitoring” project the MD Department of Environment is doing nothing to help the citizens of Maryland or to improve the public health of their communities.

In addition, ACT has considerable concerns and questions about the methods that will be used to collect this ‘ambient air’ data as we are aware under COMAR that there are regulations in place to guide the MD Department of the Environment in a project such as this to measure ambient levels of ammonia, however what we have read in the MOU and listened to at the April 25 meeting leave us concerned this project may not be guided by current regulations. Finally, to better understand MDE’s methodology we wish to advise you ACT has consulted with Environmental Action Center (EAC) on their written comments submitted today, May 22 and we will look forward to MDE’s response to the EAC comments. We’re confident your response to EAC may help to alleviate our concerns.

Signed Kathy Phillips, Executive Director, Assateague Coastal Trust

Response: We see the partnership with the industry and a private foundation as an opportunity to accomplish something that would not otherwise get done. As noted earlier, decisions regarding the Department’s monitoring project are made solely by the Department, and it should be noted that our decisions are based on scientific expertise and our experience in locating and operating air pollution monitoring stations across the state for several decades using sound scientific principles established by the federal Environmental Protection Agency.

As for whether the Department is following its own requirements for measuring ammonia, we assume the comment refers to how the Department determines whether emissions of toxic air pollutants, such as ammonia, from a regulated air pollution source seeking a permit from the Department are injurious to public health. This comment is similar to one raised by the Environmental Action Center (see the response to their comment later in this document).

Once data from the lower eastern shore monitors is collected it will, as mentioned, be compared to the data collected from the two other monitors included in this project. There is a 24-hour and a yearly federal, ambient, public health based standard for fine particulate matter, so the monitored values for this pollutant will also be compared to those standards. As for ammonia, which does not have a federal, ambient standard, there will also be a comparison made of the lower shore data to several health-based pollutant concentration thresholds set by federal agencies and any other thresholds used in studies to determine if there is a potential risk to public health at the levels measured over the year-long course of the monitoring project.

As a reminder, the Department will be making all monitoring data available for public viewing and use. Anyone is free to use the data to make their own evaluations as to its public health implications.

Comment: Thank you for the opportunity to discuss MDE's proposed air monitoring study of emissions from poultry concentrated animal feeding operations. We would like to discuss some of our concerns with the proposed cooperative study and MDE's role as the regulatory agency charged with regulating air emissions. The Memorandum of Understanding (MOU), dated January 28, 2019, between MDE, the Keith Campbell Foundation (Campbell Foundation), and the Delmarva Poultry Industry (DPI) outlines the participants in the proposed air monitoring study, its general aims, and the limitations to the interpretation and use(s) of its results. The MOU states its purpose as "[collecting data] to provide information about ambient concentrations of pollutants in the vicinity of poultry operations." (MOU at 2). The stated purpose presumably addresses the introductory issue statements in the MOU citing:

"[T]here have been claims that air quality within some communities in rural areas is unhealthy due to concentrated animal feeding operations (CAFO's) involving poultry and, more particularly, that ammonia and particulate emissions from poultry houses adversely affect health illnesses, such as asthma..[but] the lack of monitoring stations on the lower Eastern Shore in the vicinity of poultry operations does not allow for a scientifically –based approach to determining any potential link between poultry operations on the lower Eastern Shore and adverse health effects."

(MOU at 1.) It is the need for a scientifically-based approach that we would like to bring into focus.

Measuring ammonia from the source

As you know, there are reliable estimates for ammonia emissions from poultry houses (see EPA CERCLA and EPCRA Reporting for Farms: Ammonia Emission Rates for Poultry Operations, relying on Wheeler et al. 2006; Burns et al. 2007; and Gates et al. 2008.) Unlike emissions estimates, however, due to the variable phases of ammonia as it is emitted from the poultry house and into the atmosphere it is difficult to determine ammonia levels further from the source. Once ammonia exits the poultry house through an exhaust fan (or is released from a manure storage shed), it can quickly undergo phasic changes from ammonia into ammonium particulates. This has made determination of ammonia concentrations over distance from the source difficult to quantify.

Over the past decade, however, researchers have developed reliable methods to consistently and accurately collect data. Reliable techniques for quantifying ammonia dispersion include open path laser measurements of ammonia concentrations across downstream gradients and passive sampling arrays downwind of CAFOs. (see Siefert, R.L. et al. 2004. Characterization of Atmospheric Ammonia Emissions from a Commercial Chicken House on the Delmarva Peninsula. *Environ. Sci. Technol*, 38, 2769-2778; Fairchild, B.D. et al. 2009. Ammonia concentrations downstream of broiler operations. *J of Applied Poultry Research*, 18.3 (2009): 630-639.) These studies showed high average ambient air levels within approximately 300-500 feet of the source.

An air monitoring project without a clear design or goal

MDE indicates that the monitoring site will be in an area with a large concentration of poultry houses. The project also proposes to include two sampling units: one upwind and one downwind. This description leaves a great deal of questions regarding the monitoring project. Perhaps the most salient question is whether MDE proposes to measure ambient ammonia levels in relation to a specific *source*, or if this is a study seeking to measure ambient air levels for a given area, such as an entire town, zip code, or neighborhood. The answer implicates entirely different sampling designs.

Notwithstanding the undetermined methods, the apparent uncertainties surrounding the methodology and intent of the project are, at least, unnecessary. MDE already has a protocol for measuring ambient ammonia levels. These methods are codified in MDE's air regulations for ammonia sources, which provide very specific protocols in determining fence-line (or, property line) ambient air levels that may unreasonably endanger human health, called an Ambient Impact Analysis. Ammonia levels must be measured and/or modeled to determine whether those levels will cause an adverse health effect. Whether or not MDE prefers to call poultry CAFOs sources, it should follow its own procedures. To do otherwise risks arbitrarily ginning up air monitoring projects that are neither modeled after peer-reviewed studies, nor follow Maryland regulatory requirements. As a result, we request that MDE adhere to its own regulations and policies to monitor and enforce sources of air pollution.

Public perception and skewing toward the null hypothesis

Why is simple data collection such a potential problem? As you know, multiple lower Eastern Shore counties possess the highest density of poultry CAFOs in Maryland, and some of the highest densities in the United States. Currently, the only protections for local populations from air emissions are ordinances preventing poultry house construction closer than 200 feet from property line and 400 feet from a residence. There are no more protective prohibitions regarding proximity of poultry houses to residents, and MDE needs data that can shed light on air quality and ammonia levels at such distances. As mentioned above, recent peer-reviewed studies find elevated requests by the public to address air emissions from CAFOs over the past several years. This one-year monitoring project may well hold the place of a more rigorous study for at least that long, and therefore must be designed to effectively determine risks to air quality and public health.

As stated by you at the April 25th public meeting, MDE will work with DPI to find an appropriate location. Such a suggestion raises many serious concerns, not the least of which is that DPI may resist a monitoring design that seeks to test the central question here: do CAFOs emissions raise fence-line ambient ammonia to levels that unreasonably endanger human health? A study that measures ammonia at 200-400 feet may very well find such data.

The partnership with DPI also brings a problem of public perception. If the study were performed by experts contracted by DPI and the Campbell Foundation, then any potential conflicts would be transparent. Similarly, if the study were performed by the University of Maryland Eastern Shore Extension, then the public would see it as a university study funded by industry and the industry's partnering foundation. However, where MDE is 'working with' the industry to determine the siting and methods of the study, the potential conflicts become opaque. Because this monitoring project is being performed, ostensibly, by MDE, it will be considered by the public- and local governments- as a 'study' by the State.

Because lower Eastern Shore counties require a minimum distance of 200 feet to a property and 400 feet to a residence, we ask that MDE follow the regulatory guidelines for ambient impact analysis for ammonia to determine the ambient ammonia levels at the CAFO fence-line or 400 feet, whichever is closer.

Sincerely,

Environmental Action Center

David Reed, Executive Director

Response: The statement that MDE will work with the industry to find an appropriate location for the two air monitoring sites is being interpreted to mean the industry will have a say in locating the sites. This is not a correct interpretation. MDE is the scientific lead and thus selects the criteria associated with siting monitors. The sites ultimately picked by MDE will meet the primary aim of the project – to provide data on the quality of the air that the majority of residents on the lower eastern shore are breathing. MDE has sole responsibility for site selection. Suggestions for properties that meet our siting criteria are welcome from anyone, including industry, local churches, local governments and the general public.

What MDE does not have knowledge of is contact information for owners of properties that MDE has determined are potential monitoring locations based on our siting criteria. As such, it is in the best interest of the success of the study that MDE collaborate with industry to facilitate a contact between any crop growers or poultry farmers or any other entity in the poultry industry's sphere of knowledge who own property that MDE deems a potential location for an air monitoring station. Once contact is made between MDE and anyone having a link to the poultry industry is made, industry has no further role. The commenter goes further to state that the industry will not only play a role in siting the

monitors, but will also help determine the methods of the study. This is patently not a factual statement.

The commenter asks that, because lower Eastern Shore counties require a minimum distance of 200 feet to a property and 400 feet to a residence, MDE should follow the regulatory guidelines for ambient impact analysis for ammonia to determine the ambient ammonia levels at the CAFO fence-line or 400 feet, whichever is closer. The regulatory guidelines mentioned are used when determining, through a modeling exercise, whether toxic air pollutants emitted from a smokestack source has the potential to be injurious to public health. CAFO's are not required to secure an Air Quality Permit to Construct or an Air Quality Operating Permit, so they are not regulated sources of air emissions. As such, there is no regulatory basis for air monitoring to be conducted at a farm's property boundary.

Regardless, the difference between the monitoring-at-the-fence line scenario and MDE's monitoring project is that the fence line scenario, like the smokestack modeling exercise, is an effort to determine the impacts from a single pollution source. Such an effort would follow the approach advocated in the Community Health Air Act, which is to assess health impacts from individual CAFO's. Again, the objective of MDE's project is not to measure emissions or to assess impacts from individual farms, but to determine the quality of the air that most residents of the lower eastern shore breathe. This difference in study objectives dictates that monitor placement will be different under each objective.

This project is a first step in determining whether there are any adverse health effects from CAFO's on the lower shore. Until we gather data and review it, whether and to what degree any additional monitoring is warranted is an unknown.

Open laser pathway monitors are another means to measure ammonia. Their use, however, unlike the MDE project, is to measure emissions which, again, is not the purpose of the MDE project.

Comment: On April 25th I attended the air quality monitoring session at UMES and would like to provide you the following input on this effort.

First, I am a retired University of Delaware Poultry Scientist and Extension Specialist who has conducted research on air quality monitoring on poultry farms. In fact, in 2000 I proposed and demonstrated to the poultry industry (locally and nationally) the merits of installing vegetative buffers around farms in part to reduce emissions from tunnel farms. With this background I share the following regarding your proposed efforts on the Lowe Shore:

- **I, like you, struggle how to best site the monitoring stations to collect the most useful data with the least background interference.**
- **First, you may want to confirm the wind rose patterns for this area of the State. Unlike the north/south wind direction you mentioned at the meeting, most wind roses I have seen in the region have a more NW pattern in winter, changing to SW in the summer.**
- **From the examples of poultry house clusters you showed for the region, it may be difficult to site an upwind station that is still not influenced by other poultry houses in the region. In these clusters, it also be difficult to correlate production practices when you have farms from**

different integrators and flock cycles. Also, not certain the clusters you showed represent the average density of houses on Delmarva.

- A more scientific approach might be to identify an isolated poultry farm with “average” bird capacity to monitor air quality up and downwind of this farm. This would allow more accurate correlation of air quality with wind direction and flock production cycle. Locating, getting approval and having electric at such an operation could be a challenge. Also, based on research many years ago, please be aware that most farms have wooded buffers on one or more sides the farm in addition to the installation of vegetative buffers that have been promoted for more than 15 years. These buffers will alter air quality but are representative of farms in this area. It has been some of the new poultry farms that have led in part to the community/neighbor relations challenge we are dealing with today.

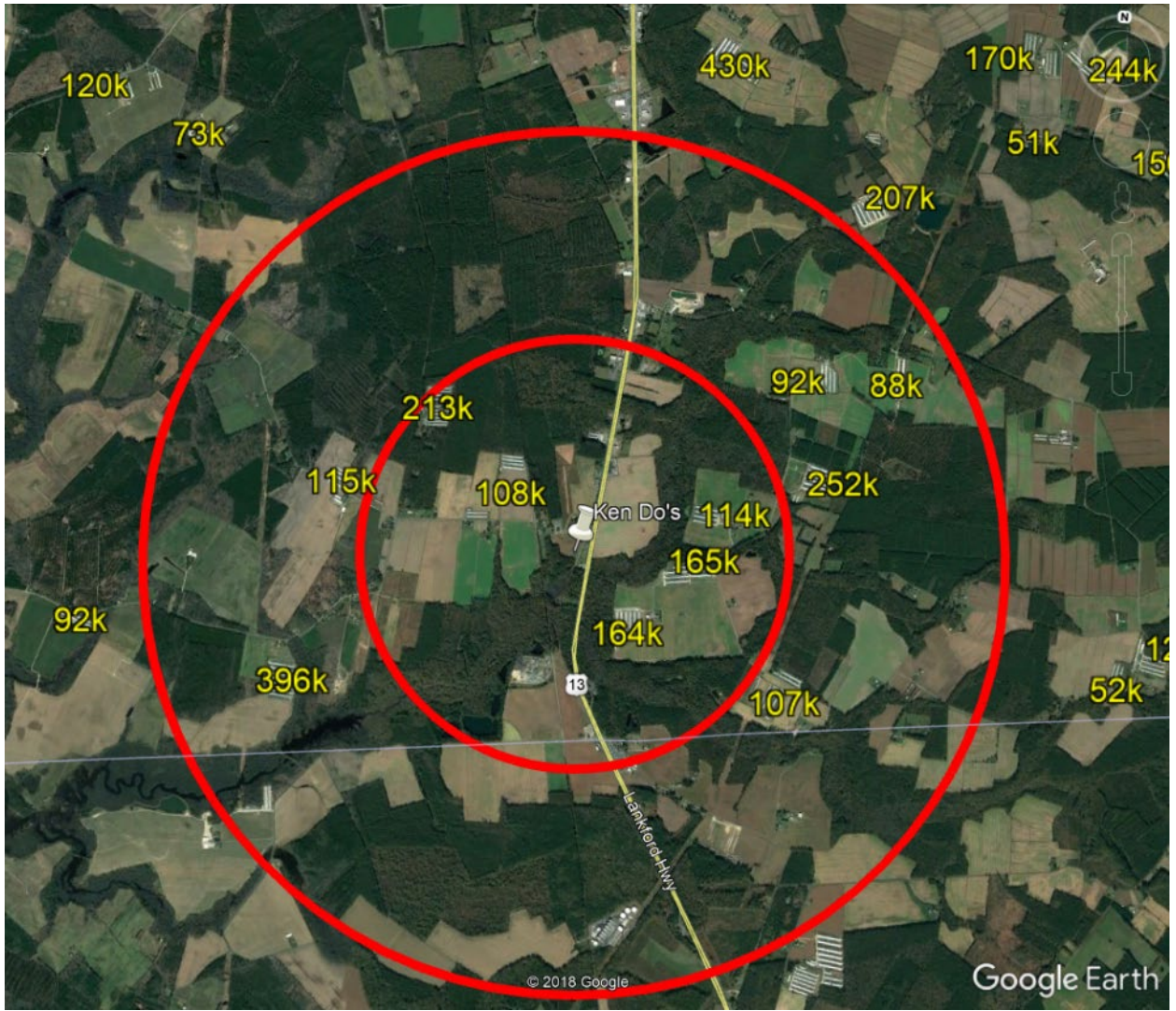
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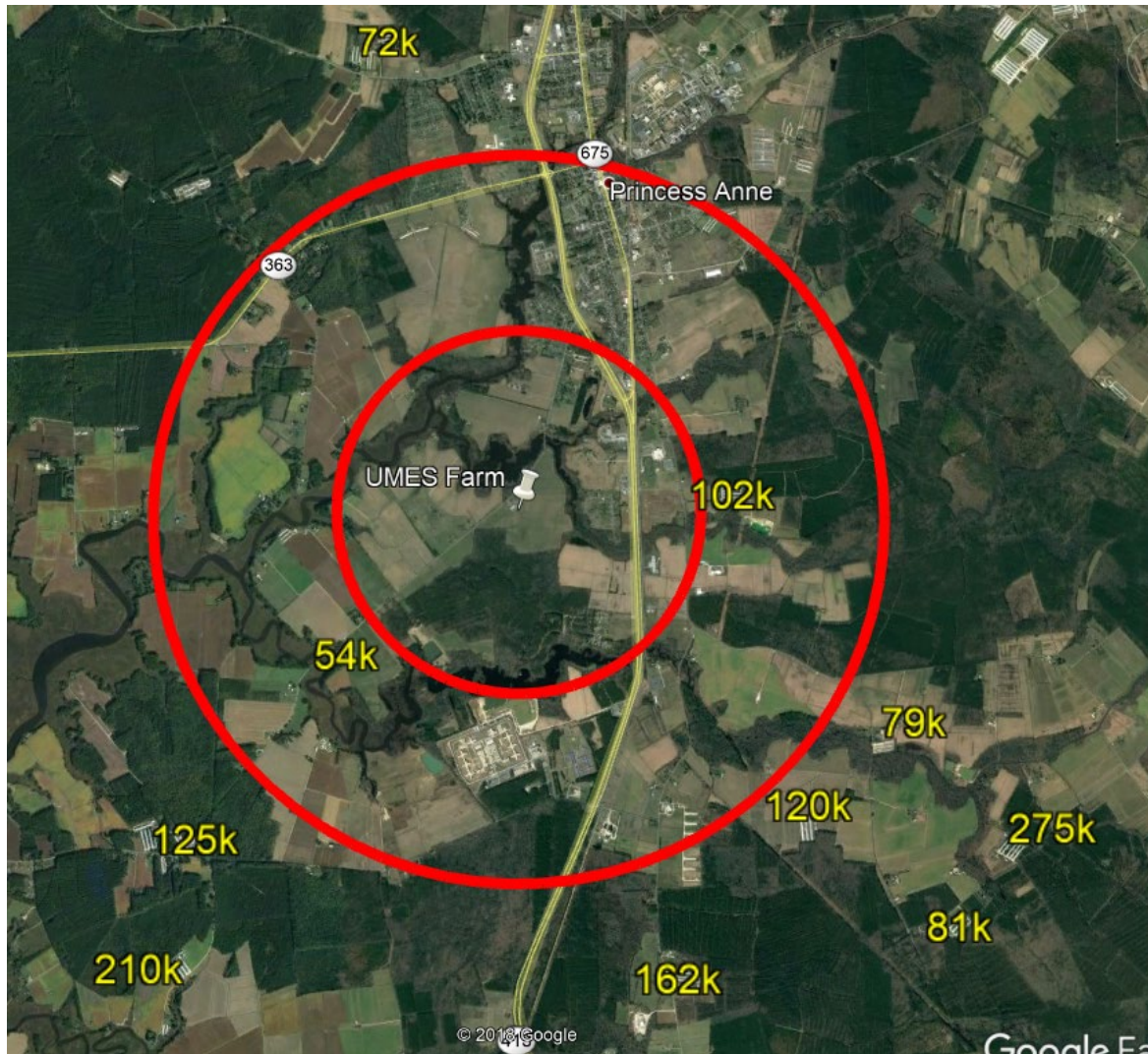
Signed Bud Malone

Response:

MDE has wind roses from the Salisbury airport for each month of the year. We will use that information when reviewing the data from the study. In terms of using the wind roses in siting the monitors, the parameters of the study have changed from when it was presented back in April. The original premise of having an upwind and a downwind monitor in a straight line between two concentrations of poultry houses was modified due to a lack of available monitoring sites. The final project design will have a monitor within a one-mile circle encompassing a number of poultry houses. This “downwind site” has been selected and is located on Route 13. The houses within that one-mile radius have a bird population of nearly 750,000 and an additional bird population of over one million between one and two miles away. The map below shows this orientation.

The upwind monitor will be located in an area that has few poultry houses (the nearest one will be over one mile from the monitor). The upwind site is to be located on a farm owned by the University of Maryland Eastern Shore. The station will be less than a half mile South of the confluence of the Manokin River and Jones Creek. The second map below shows the location of the upwind monitor.





Comment: The Chesapeake Bay Foundation, Inc. (CBF) provides the following feedback and suggestions on the Maryland Department of the Environment’s (“MDE”) Lower Eastern Shore Ambient Air Quality Monitoring Project (“the Project”) as currently described by MDE.

CBF is a non-profit conservation organization with its headquarters in Annapolis, Maryland. CBF is dedicated solely to protecting the Chesapeake Bay and its many tributaries. CBF works to ensure that land use practices throughout the entire 64,000-square-mile Bay watershed are protective of local and watershed-wide water quality through its education, advocacy, litigation, and restoration efforts. Agriculture is a focus of CBF’s work due to its prominence as a land use within the watershed. CBF works with farmers and producers to implement best management practices (“BMPs”), advocates for federal and state funds to help farmers implement BMPs, supports land use policies that slow the loss of farmland and prevent sprawl, and advocates for agricultural BMPs that are the most cost-effective strategy toward reducing nutrient and sediment pollution to the Bay.

CBF commends MDE's effort to better understand the impacts of ammonia and particulate matter emissions from poultry operation in Maryland. Producing over 300 million broilers in 2017, Maryland's poultry industry releases a significant amount of air pollution into the communities and environment of Maryland's Eastern Shore. See e.g., Md. Dep't of Nat. Res., Broiler Industry Ammonia Emissions in the Chesapeake Bay Watershed, at Abstract (June 2010), available at http://dlslibrary.state.md.us/publications/Exec/DNR/PPRP/PPRP_154_2010.pdf (ammonia emissions from the poultry industry are "significant...{f}or example, estimates for NH3 emissions for Maryland sources ranged from 12,000 to 33,000 tons annually.")

I. Expert Feedback

We have consulted with experts in the field of animal ammonia monitoring and offer the following observations and suggestions for the monitoring protocol:

1. Ensure that operation of the houses being monitored is representative of typical operations. Make sure that poultry operations contain the typical number of birds, that monitoring occurs prior to crust clean out of the houses and occurs over a representative period of time. These variables should reflect typical commercial operations;
2. The Fact Sheet for the project suggests that MDE will analyze the data obtained. That analysis should include a modeling effort that estimates the amount of nitrogen deposited within a particular domain surrounding the house for at least one mile. See also section III below;
3. Provide a map identifying the houses monitored and the monitoring stations;
4. Use a topographic map, or some other topographic device, to determine the best location for the air monitors. For example, the monitors should not be placed on the other side of a hill from the source or on the other side of a wooded lot or trees. There should be no known obstructions or adverse land use;
5. The Fact Sheet says MDE will make the data available to the public. We recommend that the data be provided in electronic and paper format within 2-3 months of it being generated;
6. Monitor locations should be along the predominate wind direction;
7. MDE should identify the type of monitoring devices that it will use for both ammonia and particulate matter ("PM"). We also recommend that ammonia monitors be placed close to the houses – within 100 meters – and farther. See also Section II below. PM monitors should be placed further downwind, 200 – 300 meters, to allow time for the PM particles to develop. We do not recommend co-locating the ammonia and PM monitors. We understand MDE plans to use two set-ups, but recommend a third to address the issues raised by the National Air Emissions Monitoring Study;
8. MDE state that there will be a "background" monitor in Baltimore City. We are not certain what information such monitoring will provide and its relevance to the proposed animal ammonia study. Please provide an explanation for this monitor and its proposed location. We note that large sources use urea to control air emissions. Such sources could confound MDE's poultry emissions study results;

9. We recommend using an ammonia monitor other than the Teledyne D201, which is subject to confounding by other amine sources. A better choice is the cavity ring-down spectrometer, an infrared measurement device made by Piccaro.
 10. Finally, we recommend placing the monitors near the largest cluster of poultry housed, with the most birds as possible.
- II. CBF urges MDE to measure emissions at, or near, the poultry house fans, rather than only the ambient concentrations downwind.

CBF encourages MDE to revise the Project to obtain data that can be used to better estimate nitrogen deposition resulting from poultry ammonia emissions. Specifically, CBF urges MDE to measure ammonia deposition at, or near, the poultry house fans to ground-truth existing emission estimates. One of the significant limitations to addressing ammonia-related deposition is the lack of data regarding the exact quantity of ammonia emissions released by poultry operations. As explained in a report by the Maryland Department of Natural Resources,

Development of emission factors that would generate representative NH₃ emissions from broiler house (and other significant livestock) operations would help improve our understanding of atmospheric deposition to the Bay. Because of the importance of the role of NH₃ emissions from the poultry industry, and the variability in emission estimates found currently in both the literature as reported by the USEPA, *additional verification of emission factors seems to be warranted.*

Md. Dep't of Nat. Res., *Broiler Industry Ammonia Emissions in the Chesapeake Bay Watershed*, at Abstract (June 2010) (emphasis added). Within the scope of the current Project, MDE should measure the actual emissions from one or more poultry houses.

On the website describing the Project, MDE states that it will “consider the distance between a potential station site and a concentration of poultry houses and homes.” In the Fact Sheet, MDE state that “[o]ne station will be downwind of a concentration of poultry houses. However, MDE should use this opportunity to collect valuable measurements (e.g., concentration, mass) of the emissions released from one or more poultry houses to address the existing data gap as previously identified by the Maryland Department of Natural Resources.

- III. CBF urges MDE to consider how poultry house emissions deposit excess nitrogen to land and water in Maryland.

Ammonia emissions from poultry houses on Maryland's Eastern Shore contribute to excess nitrogen pollution in Maryland waterbodies and throughout the Chesapeake Bay watershed. While MDE's current Project is focused on human health and ambient concentrations, CBF urges MDE to consider how these same ammonia emissions impact water quality through the deposition of reduced nitrogen.

Multiple studies have shown that ammonia emissions from poultry operations – like those located on the Eastern Shore of Maryland – can deliver substantial amounts of nitrogen directly to nearby waterways, potentially exacerbating systems already suffering from excess nitrogen pollution and eutrophication. At the time the Chesapeake Bay Total Maximum Daily Load (“Bay TMDL”) was established, it described the ammonia contribution as follows: “Reduced nitrogen, or ammonia, is responsible for approximately one-third of the total nitrogen atmospheric emissions that eventually end up as loads to the Bay. Ammonia sources are predominately agricultural, and ammonia is released into the air by volatilization of ammonia from manures and emissions from ammonia based fertilizers.”

More recently, EPA’s Chesapeake Bay Program has found that while nitrogen oxides are decreasing, loads of ammonia (reduced nitrogen) are steady or increasing. See EPA “Atmospheric Deposition Webinar Presentation”, at slide 7, 47 (“the composition of atmospheric reactive nitrogen deposition is shifting from oxidized (fossil fuel combustion) to reduced (largely agricultural)). A 2016 paper found that “[d]ry deposition of ammonia plays an especially key role in nitrogen deposition, contributing from 19% to 65% in different regions” of the United States and that ammonia emissions are projected to increase by 2050, mainly due to increases in nitrogen fertilizer application and livestock growth.

As Maryland finalizes its Phase III watershed Implementation Plan to achieve the 2025 goals of the Bay TMDL, MDE should consider how the proposed monitoring Project can be designed and implemented to address the significant nitrogen contribution from poultry ammonia emissions.

In short, ammonia emissions from poultry houses have an impact on water quality in and around the Eastern Shore of Maryland and CBF urges MDE to consider how the Project can be designed to better quantify – and mitigate – this impact on water quality.

Conclusion

CBF appreciates the opportunity to provide feedback on MDE’s Lower Eastern Shore Monitoring Project and looks forward to continued focus and conversation on the issue of ammonia emissions from poultry operations in Maryland.

Alison Prost, Executive Director, MD office of the Chesapeake Bay Foundation

Response:

Regarding comment I.1, MDE is placing a “downwind monitor” (see response to Bud Malone earlier in this document) within a half-mile of several active poultry farms containing multiple houses. These farms are representative of others on the lower shore in terms of flock size and number of houses on a given farm. The tight concentration of farms in the vicinity of the downwind monitor is higher than average. Since the monitoring effort will span a year, data will be gathered during all phases of a farm’s operation, including cleaning of the houses.

Regarding comment I.2, modeling nitrogen deposition is beyond the scope of our project. Moreover, in order to model deposition, model inputs are needed, and such inputs would be ammonia loads to the

atmosphere from each individual poultry operation within a given area. As MDE's project is not measuring or estimating emissions from any poultry operation, modeling ammonia deposition is not doable.

Regarding comment I.3, maps showing the monitor locations and the poultry operations within a one-mile and a two-mile radius are included in the response above to Mr. Bud Malone.

Regarding comment I.4, we note that MDE's project design no longer will be an upwind and a downwind monitor directly in line with a concentration of poultry houses. In the modified design the downwind monitor will sit within a ring of poultry houses and the upwind monitor will be located in an area with fewer houses. Both monitors meet the Project's main objective – to measure ambient air quality in the vicinity of a concentration of poultry houses – and will meet MDE's technical siting criteria, which takes into consideration obstruction and elevation concerns.

Regarding Comment I.5, MDE will make data available electronically every quarter. A summary of the data in paper format will be made available as well each quarter.

Regarding comment I.6, under the original design, the intent was to locate a monitor along the predominant wind direction. We note, however, that monthly wind roses from Salisbury airport show the predominant wind direction is markedly different in the summer (from the south) versus the colder months (from the northwest and the southwest), and September wind directions (from the northeast) are different than any of the other eleven months. Under the modified design, the orientation of the poultry houses relative to the monitor is such that the downwind monitor will be able to capture the ambient air quality influence of poultry operations under all wind direction scenarios. Also, this project design will provide enough measured atmospheric information to determine whether a given daily data point is linked to poultry house emissions or some other activity, such as fertilizer application.

Regarding comment I.7, MDE will use the Teledyne API Model 201 Analyzer to measure ammonia levels and the Teledyne API Model T640 PM Mass Monitor to measure both fine particulate matter and PM 10. We chose to locate the ammonia and the particulate sampler in the same shelter due to two principal factors: cost minimization (only need a single shelter) and ease of implementation (need for a single power supply, need only to provide security for a single site, need for a single access agreement and need to only prepare a single site for a shelter). The commenter's recommendation for a third monitor is based on an issue raised in EPA's National Air Emissions Monitoring Study. That study's purpose was to measure emissions directly from animal feeding operations in an attempt to develop emission factors for such operations that can be used to estimate emissions from operations similar to the ones studied. MDE's study is focused on gathering data on ground-level, ambient pollutant levels.

Regarding comment I.8, the purpose of the Baltimore City background monitor is to gather information of what ambient ammonia background levels are in an area totally devoid of poultry houses or crop farming. This background monitor will be located in Baltimore City just northeast of the Inner Harbor area at the Oldtown Fire Station, 1100 Hillen St. A second background monitor is located on the Eastern Shore at the Horn Point lab west of Cambridge in Dorchester County, and that monitor will provide ambient

ammonia background levels in an area with landscape like that of the lower shore, but without the presence of poultry houses nearby. We recognize that some large sources in Baltimore City use urea to control pollutants, but the amount of urea emitted after it serves its pollution control purpose should be zero.

Regarding comment I.9, the Picarro device mentioned is an option for ammonia monitoring, however, the increased cost would not be supported by significantly improved accuracy.

Regarding comment I.10, placing the monitors near the largest cluster of poultry houses, our objective is to ascertain the quality of the air breathed by the residents of the Lower Shore who live in the vicinity of a concentration of poultry houses. In surveying the lower shore using aerial views, we believe the selected site is situated amongst a higher than average concentration of poultry houses, certainly closer to the worst-case end of the spectrum than the pristine end and will generate data that would be meaningful to the vast majority of residents of the lower shore.

Section II and Section III of the comment letter have a similar focus, and that is the recommendation that the study be restructured so that information on nitrogen deposition is obtained. MDE appreciates the recommendation, but it is far removed from the aim of the monitoring effort and it is something that the budget cannot accommodate. MDE recognizes the role of ammonia deposition relative to the health of the Bay and we welcome assistance from anyone interested in improving the quality of the data used in the Bay model. Until funds and resources can be identified, any effort to improve the ammonia deposition inputs to the Bay model cannot be pursued.

Comment: In choosing a site on the Lower Eastern Shore for the monitoring site I think you should also consider the following:

- 1. A site near poultry houses where nearby residents have testified at many of your hearings complaining of poor air quality and residue on their buildings. You may wish to consider a site with the greatest number of nearby residents complaining.**
- 2. A site where nearby residents are encouraged to express their concerns about the air quality on an ongoing and daily basis, which is then recorded with a timestamp and correlated with the readings of the monitoring equipment.**
- 3. A site with nearby weather monitoring sites (e.g. WBOC residential weather monitors), whose readings can also be correlated with the readings of the monitoring equipment.**

Signed Joe Jankowski

Response: As stated earlier, the purpose of the MDE project is to take a first step in determining the quality of the air breathed by the residents of the Lower Shore who live in the vicinity of a concentration of poultry houses. To do that we chose to measure air quality at a site that provides enough information that is transferrable to the majority of residents near poultry operations. Whether and to what degree additional studies will take place to evaluate the situation described by commenter will be decided after the initial study results are evaluated and available resources are determined.

Regarding weather information, both of MDE's stations will have equipment to measure weather conditions: wind speed and direction, rainfall, humidity, and temperature.

Comment: Dear MDE – I attended the meeting at UMES Re air monitoring. At UMES I teach a graduate class in statistical sampling. From my perspective, the study does not meet basic criteria for scientific or statistical validity. The reasons for this are: 1) You have only two stations, one upwind and the other downwind of a single location (CAFO), so your sample size is too small for any comparative analysis. 2) repetitive observations at those sites are not independent, and 3) site selection is not random so the results will be biased towards the site you select. The only way to achieve statistical validity is to sample at numerous locations that are selected using a valid sampling method, which could be random, systematic, or stratified. I realize there are limitations to your equipment, e.g, it is expensive, large and needs power. However, that doesn't fix the problem.

Signed Bradley G. Stevens, Ph. D.

Response: Ideally, it is always better to have more, rather than fewer monitoring sites when trying to determine the impact of a concentrated group of air pollution sources on air quality in a given area. There are, however, many practical logistical constraints that can limit the ability to deploy an ideal number of monitors. In the case of this project, MDE wishes to collect highly time-resolved (i.e. one-minute) concentrations of gaseous ammonia and particulate matter in order to understand their relation to contemporaneous meteorological measurements and proximity to poultry houses. As mentioned in the comment, the instrumentation required to generate this information (analyzers, dilution calibrators, gas cylinders, etc.) is bulky, expensive and requires an environmentally controlled shelter and reasonable access to a reliable power supply. Therefore, it is not possible to have more monitoring sites given the limited budget available for this project. In addition, finding suitable locations for monitoring where there are minimal obstructions to air flow (e.g. trees and buildings), landowner permission can be obtained along with easy vehicle access, electricity availability and adequate security, can present significant obstacles. In fact, as mentioned in the responses to other commenters, the original premise of having an upwind and a downwind monitor in a straight line with a large concentration of poultry houses between them was modified due to a lack of availability of suitable monitoring sites. The final project design will have one site centrally located with a number of poultry houses that fit within a circle with a one-mile radius.

In the federal regulations (Title 40 of the Code of Federal Regulation, Part 58, Appendix D) that spell out the ambient air network design criteria for determining compliance with the National Ambient Air Quality Standards (NAAQS), EPA specifically acknowledges that monitors cannot operate in every time and space through the concept of "representativeness." The premise is that monitors located in areas with similar population densities, similar emission source characteristics, and similar meteorological conditions should measure similar concentrations of air pollution. MDE will be following these siting criteria.

