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Angelo Bianca, Deputy Director
Air and Radiation Administration
Maryland Department of the Environment
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Sent via email: angelo.bianca@maryland.gov

March 29, 2021

Dear Mr. Bianca,

Thank you for monitoring air quality on Maryland's Lower Eastern Shore. Residents in this region have long deserved better information about the air they breathe. However, significant data gaps still exist, particularly for residents who live closest to large poultry operations. The Environmental Integrity Project, Assateague Coastal Trust, the Center for Progressive Reform, Waterkeepers Chesapeake, and Chesapeake Legal Alliance are writing to provide additional information concerning ammonia concentrations measured close to poultry operations. We are also writing to express our interest in working with the Maryland Department of Environment, and any other interested parties, to site and operate monitoring equipment from the Lower Eastern Shore Ambient Air Monitoring Project closer to poultry houses, where the monitoring data may provide residents, industry, and the public with a better understanding of the exposure levels experienced by fence line residents.

According to MDE's website, MDE's air quality experts are sampling air quality on the Lower Eastern Shore "in answer to ongoing concerns regarding the potential effects of large poultry houses on air quality." This data collection effort was not designed to provide the answers sought by the residents who live closest to poultry operations. MDE's high density poultry operation site in Princess Anne, Maryland is located about a third of a mile (525 meters) from the nearest poultry operation and is separated from poultry operations by forest buffers, which disburse and remove ammonia and other pollutants from the air.¹ But residents who live much closer to poultry operations are more likely to be exposed to higher concentrations of ammonia and particulates, especially where operators have not established forest or vegetative buffers to disburse and reduce concentrations of these pollutants before they are blown off-site.

¹ Forested areas and vegetative buffers, when comprised of optimal tree and shrub species and when designed maintained properly, have been found to decrease downwind concentrations of ammonia by 46-51 percent. Ro, et al. (2018) "Enhanced Dispersion and Removal of Ammonia Emitted from a Poultry House with a Vegetative Environmental Buffer." *Agriculture*. 8(4), 46; <https://doi.org/10.3390/agriculture8040046>; and University of Delaware, "Efficacy of Vegetative Environmental Buffers to Capture Emissions from Tunnel Ventilated Poultry Houses," Available at: <https://www.udel.edu/academics/colleges/canr/cooperative-extension/fact-sheets/efficacy-of-vegetative-environmental-buffers/>.

The Environmental Integrity Project and the Assateague Coastal Trust (EIP/ACT) are monitoring gaseous ammonia concentrations at a residential property on College Backbone Rd. in Princess Anne, Maryland using Radiello diffusive samplers. A 6-house poultry operation is located on the adjacent property. Between June 9, 2020 and November 24, 2020, the two-week average concentrations measured along the fence line between the poultry operation and the residential property averaged 4.5 times higher than the two-week average of hourly concentrations detected at MDE’s “high density poultry operation” monitoring site in Pocomoke City, Maryland. We surmise the higher concentrations are due to closer proximity to the poultry operation and a lack of forested buffer.

The table below compares ammonia levels detected by EIP/ACT at the residence along College Backbone Rd. and MDE’s Pocomoke City high density poultry operation sampling site.

Sampling Start	Sampling End	Two-Week Average Concentration (ppb)		Range of hourly concentrations (ppb)
		College Backbone Rd. (EIP/ACT)	Pocomoke City (MDE)	Pocomoke City
6/9/2020 12:49 PM	6/23/2020 9:05 AM	36.8	12.8	4.8 – 69.1
6/23/2020 9:15 AM	7/7/2020 9:03 AM	37.5	10.0	5.1 – 28.2
7/7/2020 9:14 AM	7/21/2020 9:25 AM	89.7	20.6	6.4 – 177.8
7/21/2020 9:34 AM	8/5/2020 9:14 AM	95.0	16.0	6.7 – 69.3
8/5/2020 9:23 AM	8/18/2020 9:09 AM	45.8	19.9	4.2 – 104.5
8/18/2020 9:22 AM	9/1/2020 9:09 AM	0.04*	8.0	2.1 – 33.1
9/1/2020 9:16 AM	9/15/2020 9:18 AM	68.7	8.0	1.8 - 34.6
9/15/2020 9:24 AM	9/29/2020 9:30 AM	44.8	9.0	0.2 – 119.8
9/29/2020 9:40 AM	10/13/2020 9:57 AM	33.3	8.9	1.4 – 44.9
10/13/2020 10:00 AM	10/27/2020 9:22 AM	106.2	16.8	0.6 – 160.6
10/27/2020 9:27 AM	11/10/2020 9:15 AM	64.5	14.3	2.2 – 78.9
11/10/2020 9:20 AM	11/24/2020 9:38 AM	30.0	7.8	1.7 – 118.5
Average (6/9/2020-11/24/2020)**		59.3	13.1	3.2 – 91.5

* Potential lab or sampling error

** Excludes 8/18/2020-9/1/2020 sampling period due to outlier at the College Backbone Road sampling site.

The two week average concentrations measured at College Backbone Rd. were high enough to suggest that shorter-term concentrations may exceed MDE’s air toxics screening levels for ammonia, based on a comparison between the average and peak concentrations detected at MDE’s Pocomoke City monitor. The ammonia levels MDE measured at Pocomoke City between July 7 and July 21, 2020 ranged from 6.4 to 177.8 ppb, with a mean of 20.58 ppb. The maximum was over 8.5 times higher than the mean. If you apply that same multiplier to the average detected by EIP/ACT at a residence on College Backbone Rd. over the same two-week time period, peak hourly concentrations could have been around 762.7 ppb. Using the same math, it’s possible that peak hourly concentrations could have been as high as 1,008.6 ppb between October 13 and October 27, 2020 (9.5 times higher than the average). These estimated

hourly peak values would be more than two to three times higher than MDE's 1-hour risk screening level of 350 ppb.

Sampling results from the College Backbone Rd. residence are consistent with earlier sampling conducted by EIP over 3-month study periods in 2016 and 2017 at the same location. Two-week average concentrations ranged between 19.18 to 194.75 ppb, with three-month averages between 53.84 and 57.02 ppb. The highest *two-week average* concentration, 194.75 ppb, is higher than the *maximum hourly* concentration measured to date by MDE at its Pocomoke City site, 177.8 ppb.

EIP also monitored at another residence on Backbone Rd. in 2016 and 2017 to quantify the impact that proximity to poultry houses and forested areas have on gaseous ammonia concentrations. Not surprisingly, higher concentrations were detected closer to the poultry operation and when there were no forested areas standing between the monitor and the source of emissions. Two-week average concentrations ranged from 2.14 to 13.07 ppb when a forested area stood between the poultry houses and a monitor located 260 meters from the nearest poultry house. These averages were similar to the results measured at MDE's Pocomoke City site. One week average concentrations ranged from 9.93 to 80.86 at a distance of 122 meters from the same operation, without forest or a mature shelterbelt or vegetative environmental buffer between the monitor and the poultry houses.²

Peer reviewed studies have documented even higher concentrations of ammonia close to poultry operations. A 2018 air monitoring study found 6-and 12-hour average ammonia concentrations within 47 meters of a poultry house tunnel fan in Delaware ranging from 103 to 2,740 ppb.³ This study measured ammonia concentrations with Radiello diffusive samplers over 6.5-12 hour time periods at night and during the day. Ammonia concentrations decreased with distance from the poultry house tunnel fans. The emission plume followed the direction and airflow rate of the tunnel fan, rather than ambient wind speed and direction.

Given the relatively higher gaseous ammonia levels that fence line residents are exposed to, we would like to explore opportunities to work with MDE, and any other interested parties, to monitor hourly concentrations of ammonia and particulate matter in locations that better represent what these residents breathe every day.⁴ In addition to informing actions that will protect public health, collecting data in fence line areas would better inform efforts to identify and address air quality natural resource concerns associated with poultry operation emissions. It would also help build support for installation of

² There is now a full-grown shelterbelt of trees and shrubs around this poultry operation.

³ Yao et al. (2018) Assessment of particulate matter and ammonia emission concentrations and respective plume profiles from a commercial poultry house. *Environmental Pollution* 238 10-16.
<https://doi.org/10.1016/j.envpol.2018.02.039>

⁴The January 25, 2019 Memorandum of Understanding between the Department, the Campbell Foundation, and the Delmarva Poultry Industry (now the Delmarva Chicken Association) states: "Following completion of the [Lower Eastern Shore Ambient Air Quality Monitoring Project], the Department will, upon request and subject to availability, allow the gifted equipment [from the Campbell Foundation] to be used by academia and other entities to conduct further research on air pollution."

<https://mde.maryland.gov/programs/Air/AirQualityMonitoring/Documents/PoultryProject/PoultryMOU.pdf> p. 4

best management practices that reduce the impacts of off-site air pollution, including atmospheric deposition of nitrogen to the Chesapeake Bay.

We respectfully request the opportunity to discuss this letter and any potential opportunities to work with MDE and other stakeholders to address this important issue. Please feel free to contact Courtney Bernhardt at cbernhardt@environmentalintegrity.org or 202-263-4447 should you have any questions or if you would like to schedule a meeting.

Thank you,

A handwritten signature in black ink that reads "Courtney Bernhardt". The signature is written in a cursive style with a large initial 'C' and 'B'.

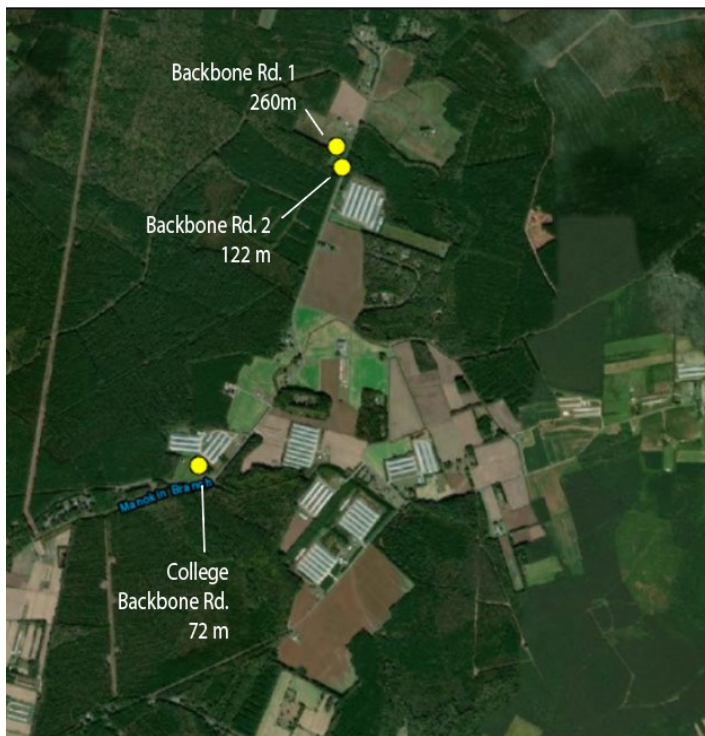
Courtney Bernhardt
Research Director
Environmental Integrity Project

Attachments

College Backbone Rd. sorbent tube monitor, 2020:



Site map:



Sampling results from 2016 and 2017 EIP ammonia monitoring project

Date start	Date end	Average Concentration (ppb)		
		College Backbone Rd. (72m from nearest poultry house, no forest or tree buffer) (ppb)	Backbone Rd. 1 (260m from nearest poultry house, forest and immature tree buffer)	Backbone Rd. 2 (122 m from nearest poultry house, immature tree buffer but no forest)
9/6/2016	9/20/2016	42.77*	13.07	Not sampled
9/20/2016	10/4/2016	194.75	2.89	Not sampled
10/4/2016	10/18/2016	50.56	2.14*	Not sampled
10/18/2016	11/1/2016	12.92	2.96	Not sampled
11/1/2016	11/15/2016	19.71*	3.90	Not sampled
11/15/2016	11/29/2016	21.40	5.63	Not sampled
5/16/2017	5/23/2017	41.61	Not sampled	25.15
5/23/2017	5/30/2017	85.49	Not sampled	9.93
5/30/2017	6/6/2017	50.30	Not sampled	11.02*
6/6/2017	6/13/2017	116.37	Not sampled	13.36
6/13/2017	6/20/2017	131.90	Not sampled	14.70
6/20/2017	6/27/2017	20.04	Not sampled	10.52
6/27/2017	7/5/2017	33.40*	Not sampled	36.35
7/5/2017	7/11/2017	46.47	Not sampled	62.66
7/11/2017	7/18/2017	21.30	Not sampled	87.74
7/18/2017	7/25/2017	19.18	Not sampled	80.86
7/25/2017	8/1/2017	56.11	Not sampled	23.46
8/1/2017	8/8/2017	23.85	Not sampled	21.90
	2016 average	57.02	5.1	NA
	2017 average	53.84	NA	33.14