**Delta County Board of County Commissioners**

Hostetler Western Slope Layers Poultry Facility

Special Development Application Hearing May 1, 2013

Expert Testimony by Kathy J. Martin, PE (OK #18254)

The following written testimony was developed by Kathy J. Martin, PE at the request of Susan Raymond and other concerned citizens living in the vicinity of the Hostetler Western Slope Layer poultry facility. In preparation for this testimony, Ms. Martin reviewed those documents submitted to the County Commissioners including the August 27, 2012 Report by Plateau, Inc titled “Inspection and Air Testing, Hostetler Poultry Farm”, the September 28, 2012 Amendment to the original report, the October 12, 2012 Memorandum from Director of Environmental Health Kenneth Nordstron to Delta County Board of Commissioners, and the University of Georgia brochure titled “Nuisance Myths and Poultry Farming”.

In addition, Ms. Martin performed a literature survey of poultry facility air monitoring, air pollution issues related to poultry barn ventilation systems, and health effects of various poultry sourced endotoxins, ammonia, and dusts.

Kathy J. Martin, PE has a MS in Civil Engineering from the University of Oklahoma with an emphasis on environmental engineering, including but not limited to air pollution engineering and controls, drinking water and wastewater treatment methods, solid and hazardous waste disposal, industrial hygiene, risk assessment, water pollution transport and fate, soil taxonomy, surface colloidal science, and computer modeling. Ms. Martin has performed third-party engineering review of livestock production facility waste management systems for over 15 years, including over 200 facilities in 21 states.

Upon review of the August 27, 2012 Plateau Report, several key questions remain unanswered:

* Was the facility fully stocked with layers?
* Did the chickens go outside during the sampling period?
* Why was sawdust brought in before the testing and how does that affect the results?
* How much of the dirt floor was covered with sawdust and thus reduced the amount of mineral sourced dust during the sampling period?
* What was the ambient temperature and humidity at the property boundary?
* Why are there two spreadsheets for the particulate sample results that have the sample exact sample times but different values measured?
* Why did they combine the upgradient and downgradient particulate air samples into one data set instead of two data sets that could be compared against each other?

**1. No map showing location of various air sampling locations**

The Report attempts to explain where the particulate air samples were taken without providing a detailed map of the barn that shows the front and rear transects and how far from the barn along that transect each air sample was taken. The Report uses terms of “left” and “right” without a description of whether that is the side of the barn where the dirt lot is located or the side of the barn where the woods are located. The front of the barn is to the northeast and the rear of the barn is to the southwest. Let us assume for this discussion that the “left” side of the barn is towards the woods and the “right” side of the barn is towards the open dirt pen.

**2. Front transect air samples.**

The testing of the front transect is described as starting at a distance of 50 feet away from the barn and 36 feet from the center line of the barn (left of the front entrance – towards the woods). Then samples (1 to 13) were taken every ten feet, which for the front transect would equate to 13 samples x 10 feet or 130 feet.

Samples 3 through 7 were basically taken at locations where air movement was blocked by the barn. Sample 1 was taken 11 feet from the barn and represents air flow coming down the length of the barn on the woods side. It is assumed that Sample 1 was the farthest one could go on the “left” side of the barn without tumbling into the woods. Sample 2 would be 1 foot from the barn and might also capture the air stream coming down the length of the barn on the woods side of the property.

Samples 3, 4, 5, 6, and 7 would be taken basically along the 50 feet of barn width with sample 7 located 1 foot inside the barn width. Of the five samples taken along the barn width, samples 4 and 5 registered the highest values and would be located by the front door of the barn:

 Sample 3 52,972 p/m3

 Sample 4 188,580 p/m3

 Sample 5 271,216 p/m3

 Sample 6 131,370 p/m3

 Sample 7 103,825 p/m3

Samples 8, 9, 10, 11, 12, and 13 were taken on the “right” side of the barn for a distance of approximately 60 feet and would intersect any air pollution pushed up from the rear of the barn across the dirt pens, across the various fans, and across the opened air curtain. The Report does not mention whether the samples on this part of the front transect were taken at the same elevation as the other samples.

The report claims that the largest value for particulates was found to the “right” side of the barn along the front transect and that the plume width was 35 feet. Looking at the spreadsheet attached to the Plateau Report, on the rows for Samples 8, 9, 10, and 11 you can see significantly higher values for 5 microns as compared to Sample 1 and 13:

Sample 1 61,447 p/m3

Sample 8 694,992 p/m3

Sample 9 747,964 p/m3

Sample 10 684,398 p/m3

Sample 11 754,321 p/m3

Sample 13 61,447 p/m3

Sample 11 is 12 times higher than both Sample 1 (left side) and Sample 13 (right side).

**3. Rear transact air samples**

The narrative portion of the Plateau Report does not elaborate on the starting point of the rear transact, only that “a similar transect was established at the rear of the building, along which samples 14 through 22 were measured.” It is assumed then that the remaining air samples (14 to 22) were taken from a rear transect which occurs 50 feet from the rear of the barn. In this instance, a total of 9 samples taken 10 feet apart and would represent 90 feet of air sampling with the first 11 feet located to the “left” by the woods, 50 feet encompassing the rear barn width, and the remaining 19 feet located to the “right” of the rear of the barn by the enclosed dirt pen

The spreadsheet of the particulate samples shows an interesting pattern to the rear transect data that was not explained by Plateau in the report narrative.

 Sample 14 74,160 p/m3

 Sample 15 425,894 p/m3

 Sample 16 673,803 p/m3

 Sample 17 33,902 p/m3

 Sample 18 12,713 p/m3

 Sample 19 21,188 p/m3

 Sample 20 27,545 p/m3

Sample 21 48,832 p/m3

Sample 22 16,951 p/m3

Sample 14 and Sample 1 were both taken on the “left” or woods side of the barn and are comparable in value. Samples 15 and 16 are the highest values on the rear transect and correspond to positions very near the left rear corner of the barn. No explanation is provided to explain why Sample 16 is 9 times the value of Sample 14 which is located a mere 20 feet away. No explanation is given why the values for Sample 16 is 56 times the value of Sample 18, also a mere 20 feet away.

**4. Spreadsheet of particulate data averages upgradient and downgradient data**

It is unclear why Plateau did not create two separate data sets on their monitor so that when they downloaded the data they could compare the upgradient and downgradient data. Instead, it appears the two transects were sampled as one complete sampling event with a 14 minute gap between Sample 13 and Sample 14, which is assumed to be the amount of time it took to walk from the front of the barn to the rear of the barn.

If one is really going to compare upgradient and downgradient data, then you would need to separate data sets that could be analyzed using statistical methods. It would also be helpful to map out the concentrations to illustrate high and low concentrations of various particle sizes.

To further consternate the reader, there are two spreadsheets that appear to be collected at the same exact time but represent different values. No explanation is provided in the narrative portion of the Plateau Report. It should be noted that my analyses was based on the first spreadsheet only.

**5. Inhalable/Respirable versus visible particulate sizes**

Inhalable particles are all sizes of particles that can be breathed in through the nose or mouth. A subset of the inhalable particles is something called the thoracic fraction (12 to 35 microns) that are small enough to pass the larynx and enter the trachea at the top of the lungs. The respirable fraction represents particle sizes that can traverse the trachea and enter the deeper portions of the lungs or basically less than 10 microns. (see EPA website: <http://www.epa.gov/pm/basic.html>)



Figure 1: Comparison of particulates to other known objects, EPA website.

The Lighthouse 3016 handheld laser particle counter has the capacity to measure particle sizes from 0.3 microns to 25 microns. Plateau chose to monitor six of those channels: 0.3, 0.5, 1.0, 3.0, 5.0, and 10.0 microns. These sizes represent respirable particulates.

Particles of 2.5 microns contribute to air pollution called “haze”. Visible particulate sizes are generally greater than 5 microns and is dependent on atmospheric conditions and lighting. <https://www.coloradoci.com/bin-pdf/5270/ParticleSize.pdf>

Data for respirable particulates (1.0 and 3.0 microns) in the Plateau spreadsheet appear to correlate with the larger particulates (5 and 10 microns) in that the smallest measured values occurred at the location for Sample 12. However, the smallest measured values for the very finest particulates, such as 0.3 and 0.5 microns occurred at Sample 1 not Sample 12. No explanation was provided by Plateau to explain why the more health adverse particulates sizes occurred at completely different places than the visible spectrum particulate sizes.

**6. October 12, 2012 Memorandum**

In the October 12, 2012 Ken Nordstrom memorandum, he states “The Colorado State Statutes exempt agricultural animal feeding operations from air pollution control regulation pursuant to CRS 25-7-109(8)(a).” I was fortunate to actually participate in much of the discussion that led up to the passing of the Colorado Odor regulations for swine CAFOs known as Regulation No. 2 back in 1999, which occurred after passage of Amendment 14 in 1998. I understand that there are no odor regulations for poultry facilities, but to claim there are no air pollution regulations for CAFOs at all is not true and belittles the tremendous accomplish made by citizens to create and pass such regulation.

From the State of Colorado website: “Colorado Air Quality Control Commission Regulation No. 2, Part B, which requires housed commercial swine feeding operations to obtain an operating [air] permit and an Odor Management Plan that details how the facility will to minimize odor from all aspects of the operation to the greatest extent possible.” <http://www.colorado.gov/cs/Satellite/CDPHE-DEHS/CBON/1251588151450>