TECHNICAL REVIEW AND EVALUATION OF

AIR EMISSIONS INFORMATION – WESTERN SLOPE LAYERS

HOTCHKISS, CO

WITH REGARDS TO DELTA COUNTY

BOARD OF COUNTY COMISSIONERS

SPECIFIC DEVELOPMENT APPROVAL SD11-006

Prepared by:

Air Resource Specialists, Inc.
1901 Sharp Point Drive, Suite E
Fort Collins, CO 80525
Phone: 970-484-7941
www.air-resource.com

Authors:

D. Howard Gebhart

Lincoln Sherman

April 30, 2013

Introduction and Background

Air Resource Specialists, Inc. (ARS) has been retained to provide expert technical support with regards to air quality impacts associated with a chicken egg laying facility located near Hotchkiss, Colorado. The site is operated by Western Slope Layers and is located at 34637 Powell Mesa Road. The closest residence is approximately 820 feet from the facility.

The egg laying facility started operations in April 2012. Since that time, neighboring property owners have complained of adverse effects from the facility operation, including visible emissions, deposition of waste materials on neighboring property, and adverse health effects from exposure to airborne pollutants released at the site.

Based on information provided to ARS, the site consists of a 50 by 400 foot metal building containing approximately 15,000 hens, which has an open air pen on one side of the building. The building is ventilated by fans, which can operate in one of two modes. To our knowledge, there is no filtration or other mitigation for emissions contained in the building air exhaust.

In the "general ventilation mode," fans on the side wall of the building are operated to maintain appropriate temperature within the building. When additional airflow is needed to maintain temperature and other environmental conditions within the building, larger fans on the ends of the building start and this operation is known as "tunnel ventilation mode". Under "tunnel ventilation mode," the airflow exiting the building increases substantially.

Qualifications of the Authors

This report is authored by Mr. D. Howard Gebhart and Mr. Lincoln Sherman. Both Mr. Gebhart and Mr. Sherman are employed at Air Resource Specialists, Inc., 1901 Sharp Point Drive, Suite E, Fort Collins, CO 80525.

Mr. Gebhart is an air quality professional with more than 30 years' experience. His expertise includes conducting air quality assessments for use in permitting and environmental impact analyses. He collects and analyzes air quality data, and executes air dispersion modeling to assess the ambient air quality impacts of commercial and industrial facilities. He has also acted as an expert witness testifying about air quality issues and the air quality impacts associated with commercial and industrial operations.

Mr. Sherman has 17 years' experience managing technical aspects of visibility, ambient air, and meteorology monitoring programs, including performing instrument installation, servicing, data analysis, and reporting. He has been involved in several large scale air toxics monitoring studies in Wyoming and Colorado. He is proficient in monitoring site installation and selection, and has designed and managed a variety of monitoring programs.

Professional resumes for Mr. Gebhart and Mr. Sherman are attached (See Appendix A).

Literature Review

Air quality impacts associated with animal feeding operations such as egg laying facilities are well documented in the scientific literature.

A report by the National Association of Local Boards of Health (NALBH) characterized potential impacts from animal feeding operations on local environmental conditions, including air quality (Reference 1). Based on this report, air emissions may include ammonia, hydrogen sulfide, methane, and particulate matter.

The NALBH report also documents that adverse health effects from exposure to harmful emissions associated with animal feeding operations are generally more pronounced on children due to their higher ratios of air intake compared to adults. This report also concludes that incidences of children with symptoms of asthma and similar breathing difficulties was higher in communities in and near animal feeding operations.

Odors are also a significant concern surrounding animal feeding operations. A study commissioned by the Iowa Department of Natural Resources (IDNR) looked at impacts from emissions at animal feeding operations across Iowa and found that malodorous emissions in excess of Iowa regulations occurred for about 7% of the measured samples (Reference 2). Samples downwind of chicken facilities showed about the same level of exceedance for Iowa's odor emissions standard.

However, when testing manure application sites, IDNR's measurements taken downwind of chicken manure sites showed a significantly higher rate of exceedance for Iowa's odor emission standard compared to other animal types. Measurements near application sites for chicken manure showed an exceedance rate of 46% compared to the average rate of 11% for all animal species. The IDNR study suggests that locations downwind of sites containing chicken manure are more susceptible to odor problem compared to other animal feeding operations.

Lastly, the US Environmental Protection Agency (EPA) is undertaking its National Air Emissions Monitoring Study, specifically targeted at gaining a better understanding of air emissions associated with animal feeding operations. This study included information collected at chicken layer houses located in California, Indiana, and North Carolina (References 3, 4 & 5). Based on EPA's description of the facilities tested, the Indiana and North Carolina layer houses used the "tunnel ventilation" design that is similar to that found at the Hotchkiss, CO facility.

In all cases, the EPA measured particulate matter (PM), including PM-2.5, PM-10, and total suspended particulate (TSP), volatile organic compounds (VOCs), hydrogen sulfide (H_2S), and ammonia (NH_3) in the exhaust air released at chicken laying facilities. Some of the VOCs measured in the exhaust from these facilities included acetaldehyde, hexane, and toluene, which are regulated under the Clean Air Act as hazardous air pollutants (HAPs).

August 2012 Air Monitoring at Western Slope Layers – Hotchkiss, CO

On August 16, 2012, an air monitoring study commissioned by the Delta County Health Department was conducted at Western Slope Layers. The study was conducted by Chris Lakin, PE, an industrial hygienist employed at Plateau, Inc. in Montrose, CO.

The Plateau study employed a particle counter to identify the presence of particulate matter emissions along with an absorbent trap to measure ambient concentrations of ammonia. Other measurements were taken to collect bacteria and fungus emissions. The bacteria and fungus measurements are not within the professional expertise of the authors and has not been considered further in this report.

While the Plateau study produces useful information toward the identification of air pollutants released by Western Slope Layers, the collected data on emissions are not quantitative in that the mass of emissions has not been calculated or determined. As such, the Plateau study cannot by itself be used by anyone to determine the existence or lack thereof for health effects and other adverse consequences at residences downwind of the facility.

Also, Mr. Lakin's report specifically states that any evaluation of his results with respect to potential human health effects must be done in concert with a medical specialist. Based on the administrative record in this case provided to ARS, we have found no evidence that a medical professional was ever consulted to evaluate the possible implications of the Plateau monitoring data on the health of those residents located downwind of Western Slope Layers.

In addition, there is concern as to whether the short-term sampling study described by the Plateau report provides data that are representative of actual emissions from the facility over a more extended time period. Mr. Lakin's report described the laying facility emissions as being "highly dynamic", meaning that considerable variability in the monitoring results would be expected if the monitoring were to be repeated at a different time. Under these conditions, it is unknown whether the Plateau monitoring study captured emissions typical of the average or potentially worst-case operating conditions.

Also, Mr. Lakin's report describes that his monitoring occurred when the facility operated under general ventilation mode. While this operating condition may describe the most frequent mode of operation, it is unlikely that general ventilation mode represents the "worst-case" in terms of air emissions. The alternative mode of operations (tunnel ventilation mode) results in a significant increase in airflow and as such, also likely provides for a short-term increase in the associated air emissions. Mr. Lakin's report describes the increase in airflow under tunnel ventilation mode as "noticeable".

ARS' understanding is that the tunnel ventilation mode would be employed based on increasing temperature within the egg laying building. However, along with the heat buildup, it is our expert opinion that a buildup of air pollutants (particulate matter, VOCs, ammonia, etc.) would also occur and that the onset of tunnel ventilation likely results in a short-term surge of these air emissions. Eventually, the emissions would return to normal levels after sufficient fresh air is entrained into the building. However, this surge of emissions has the potential to be the

most debilitating in terms of health impacts on downwind populations as these individuals would be exposed to greater concentrations and mass of emissions during these events. Also, depending on the duration of the tunnel ventilation mode and the magnitude of any associated emissions increase, the overall emissions mass released to the local environment may in fact be largely controlled by this operating mode, even if this condition occurs relatively infrequently.

Nevertheless, since emissions under the tunnel ventilation mode were not measured in the Plateau study, the emissions released at Western Slope Layers have not been fully documented and as such, no conclusions about the potential health impacts on downwind residents would be valid based on the study conducted.

Another concern related to the Plateau study is that Western Slope Layers apparently applied sawdust in the facility as an emissions mitigation measure only a few days prior to the air sampling study. This suggests that the owners may have known in advance that the monitoring study was planned and may have attempted to bias the monitoring results by applying emissions mitigation and perhaps modifying the plant operations in other ways in an attempt to reduce air emissions for the period of the monitoring study. If the mitigation and operating conditions were not typical of normal operations, then the Plateau study resulted in biased and non-representative measurements. In all probability, such a bias would have resulted in fewer emissions than would have otherwise occurred under normal plant operations.

Given the timing for application of sawdust within the facility immediately prior to the monitoring study, the mitigation would have also likely been at its maximum effectiveness at the time of the Plateau study. The effectiveness of mitigating emissions through application of sawdust would be expected to degrade over time. Since we are not aware of any further application of sawdust as a regular mitigation measure at Western Slope Layers, this appears to be a clear attempt by the owners to minimize air emissions solely for the purpose of the study and produce non-representative and biased study results about the facility air emissions.

That being said, the Plateau report does indicate the presence of emissions with potentially harmful health effects and other adverse consequences, despite the fact that monitoring study results are likely biased toward underestimating the actual site emissions. Mr. Lakin's report describes a "considerable plume of particulates and biological components", despite the owner's apparent effort to mitigate such emissions. The measured plume is clearly related to emissions from the egg layer operations based on Mr. Lakin documenting that the measurements within the plume were significantly greater than other measurements taken from outside the plume.

Mr. Lakin's data also shows that particulate size fraction for emissions was predominantly less than 2.5 microns in diameter (particle sizes under 2.5 microns can be inhaled by the lungs in a human being). In fact, the Plateau particle count data show the majority of counts were under 1 micron in size. Given the Plateau particle size data, any exposure to such a plume would result in a significant fraction of the pollutant mass being inhaled by exposed individuals. This increases the probability that exposed individuals would suffer from adverse health consequences.

Based on EPA data collected at similar facilities, it is also likely that the plume includes VOC emissions, including some constituents regulated under the Clean Air Act as hazardous air pollutants (HAPs). The presence of VOCs and HAPs is not indicated by the Plateau report, but no attempt was made by Plateau to measure these constituents of the emissions.

Summary and Conclusions

Air emissions from animal feeding operations, including chicken laying facilities, has been the subject of increased scrutiny in recent years due to the perceived threat for health effects and other adverse environmental consequences from air emissions released at these operations.

Data collected by USEPA as part of the National Air Emissions Monitoring Study has identified the following pollutants released at hen laying operations elsewhere in the United States: particulate matter (PM-2.5, PM-10, and TSP), volatile organic compounds (VOCs), and ammonia. Some of the VOCs released are known to be regulated as hazardous air pollutants (HAPs) under the Clean Air Act.

At the Western Slope Layers facility in Hotchkiss, CO, a monitoring study conducted on behalf of the Delta County Health Department by Plateau, Inc., also identified particulate matter and ammonia emissions as being present. Although the Plateau study did not provide sufficient information to quantify the mass of emissions, the emissions plume from the Western Slope Layers facility is characterized by Plateau as being "considerable". A visible plume for particulate emissions was also noted in the Plateau monitoring study, which corroborates the above characterization of the emissions plume.

Even though the emissions are characterized as "considerable", other evidence suggests that the monitoring study results may have been manipulated to bias the monitoring study toward minimal emissions. First, the maximum emissions scenario (tunnel ventilation mode) was not sampled during the monitoring program. Also, it appears that the owner applied sawdust in the facility as an attempt to mitigate air emissions only a few days prior to sampling. To our knowledge, the use of sawdust as mitigation is not normal practice within the facility given that similar mitigation does not appear to have been reapplied since the sampling event. Overall, our professional opinion is that the operating conditions at the time of the Plateau sampling study do not represent the normal operating conditions of the facility with respect to air emissions.

Lastly, given that the Plateau monitoring results provide only qualitative information concerning the presence of air emissions and do not provide sufficient data to allow for quantification of the associated air emissions, these results by themselves cannot be used to provide evidence of any adverse health consequences or the lack thereof. Also, the Plateau reports itself cautions that its monitoring results should not be used to determine whether or not adverse health consequences may occur in populations exposed to the monitored emissions without consulting a qualified medical professional. There is no evidence in the administrative record that a qualified medical professional was ever consulted regarding the Plateau monitoring results.

Overall, ARS' professional expert opinion is that the Plateau monitoring results can not by itself be used as credible scientific evidence that the air emissions associated with operation of the Western Slope Layers chicken egg laying facility at 34637 Powell Mesa Road, Hotchkiss, Colorado does not result in adverse health effects or other adverse environmental consequences to neighboring residents.

References

1. Hribar, C., 2010. Understanding Concentrated Animal Feeding Operations and Their Impact on Communities. National Association of Local Boards of Health, Bowling Green Ohio.

2. Iowa Department of Natural Resources, 2006. Results of the Iowa DNR Animal Feeding Operations Odor Study. Iowa Department of Natural Resources, Windsor Heights, IA.

3. USEPA, 2010a. Emissions Data from Two Layer Houses in California. Final Report for Site CA2B of the National Air Emissions Monitoring Study. US Environmental Protection Agency, Durham, NC.

4. USEPA, 2010b. Emissions Data from Two Manure-Belt Layer Houses in Indiana. Final Report for Site IN2B of the National Air Emissions Monitoring Study. US Environmental Protection Agency, Durham, NC.

5. USEPA, 2010c. Emissions Data from Two Tunnel-Ventilated High-Rise Layer Houses in North Carolina. Final Report for Site NC2B of the National Air Emissions Monitoring Study. US Environmental Protection Agency, Durham, NC.

APPENDIX A

Resumes:

Mr. D. Howard Gebhart

Mr. Lincoln Sherman

D HOWARD GEBHART

Environmental Compliance Section Manager

Air Resource Specialists, Inc.

EDUCATION

M.S. Meteorology, University of Utah 1979
B.S. Professional Meteorology, Saint Louis University 1976

MEMBERSHIPS

Air & Waste Management Association
National Weather Association
Colorado Mining Association
Nevada Mining Association
Nebraska Industrial Council on Environment

EXPERIENCE SUMMARY

Mr. Gebhart has nearly 30 years' experience in air quality permitting and compliance specializing in issues affecting regulated industries. His expertise lies with permitting and support of the ethanol industry. He manages the environmental compliance section at Air Resource Specialists, Inc., and provides technical studies and evaluations; and prepares models, client permit applications, and air emission calculations. He is well experienced in working with the federal Clean Water Act, Clean Air Act, Resource Conservation and Recovery Act (RCRA), and many similar programs enacted in many states throughout the U.S.

PROJECT EXPERIENCE

- Produces and manages quality assurance documents including quality management plans and quality assurance project plans.
- Provides technical studies and evaluations, prepares models, and prepares permit applications for a wide variety of clients.
- Provides emissions inventories, dispersion modeling, regulatory analysis and interpretation, and air compliance auditing.
- Prepares applications for new source permits under federal Prevention of Significant Deterioration (PSD) and state construction and operating permit programs.
- Provides technical studies supporting Environmental Impact Statements (EISs) and Environmental Assessments (EAs) under the National Environmental Policy Act (NEPA).
- Manages the Environmental Compliance Section team.
- Performs permitting and air quality studies for bio-fuel (ethanol), oil & gas /petroleum, mining and minerals, semiconductor, and National Park Service projects, with experience representing both government and private clients.
- Performs air pathway evaluations for releases of hazardous air pollutants from Superfund sites, hazardous waste sites, and incinerators.
- Models the potential consequences of accidental releases of hazardous materials.

LINCOLN SHERMAN

Project Manager

EDUCATION

M.S. Urban and Regional Planning (Environmental Planning concentration), University of Colorado 1997
B.S. Range-Forest Management, Colorado State University 1985

CERTIFICATIONS/TRAINING

Project Management Certificate, University of Colorado – Denver 2003
Tower Climbing Safety and Rescue Certification 2000

MEMBERSHIPS

Air & Waste Management Association
Western Energy Alliance

EXPERIENCE SUMMARY

Mr. Sherman has 16 years' experience managing technical aspects of visibility, ambient air, and meteorology monitoring programs, including performing instrument installation, servicing, data analysis, and reporting. He is proficient in monitoring site installation and selection, and has designed and managed a variety of monitoring programs. His background includes project management and research.

PROJECT EXPERIENCE

- Manages technical aspects of federal, state, and private visibility and ambient air quality/meteorology monitoring networks.
- Performs site and equipment selection of air quality stations.
- Installs and services instrumentation and support equipment at field locations.
- Installs satellite data collection equipment.
- Designs and implements power management systems for remote, low power, or solar powered monitoring systems.
- Trains site operators in routine operation and maintenance of instrumentation.
- Performs data review and troubleshooting procedures.
- Performs statistical data analysis and interpretation.
- Prepares progress reports and data summary and analysis reports.
- Coordinates on-site power and telephone utility installations.
- Remediates sites to natural conditions upon monitoring conclusion.
- Prepares and presents visibility and air quality monitoring presentations to air quality agencies.

SELECTED PUBLICATIONS

Gribovicz, L, L. Sherman, S. Cismoski, and G.S. Mercer, 2000, Visual Air Quality in the Green River Basin, Wyoming, Results From the Green River Basin Visibility Study (GRBVS), AWMA Visibility Annual Meeting, Salt Lake City, Utah, June.