1.0 Introduction

In recent years, livestock production in Iowa has undergone a dramatic shift, as fewer farms produce greater numbers of animals at each farm. As the number of animals at a given farm has increased, so have the air emissions from these farms. Some of the rural neighbors of these animal feeding operations (AFOs) have expressed concern that the increasing amount of air contaminants present at their homes and on their property is decreasing their quality of life. To increase the understanding and awareness of this issue, the Iowa Department of Natural Resources (DNR) Animal Feeding Operations Technical Workgroup was convened on February 5th, 2004, with the following mission:

"To determine air emissions characterization tools and techniques, ambient air modeling methodologies, and best management practices that can be used to estimate and mitigate air quality impacts that may occur as a result of air emissions from animal feeding operations, and to provide this information to the public."

For the workgroup, the DNR solicited participation from organizations with working knowledge of agricultural practices and technical expertise, including agricultural commodity groups, industrial associations, environmental organizations, academia, and government agencies. Workgroup participant organizations included:

- Iowa Air Emissions Assistance Program
- Iowa Chapter of Sierra Club
- Iowa Citizens for Community Improvement
- Iowa Department of Economic Development
- Iowa Department of Natural Resources
- Iowa Department of Public Health
- Iowa State Association of Counties
- Iowa State University
- Izaac Walton League
- National Soil Tilth Laboratory
- The University of Iowa
- U.S. Environmental Protection Agency

A list of all individual contributors to the workgroup is located in Table 1-1.

1.1 Purpose

Currently, there are a number of technologies and methods available that have been designed to reduce odor and gas emissions from AFOs, and these are commonly referred to as "best management practices." Although best management practices themselves are extremely useful in mitigating emissions of air contaminants, it is sometimes unclear if the practices will sufficiently reduce concentrations at a nearby residence. One tool that is available to predict whether or not a best management practice will be effective at various distances away from the livestock facility is dispersion modeling. Dispersion models are routinely used to estimate the concentration of pollutants emitted into the atmosphere. However, the ability of the model to accurately estimate downwind pollutant concentrations remains highly dependent on an accurate estimate of pollutant emission rates from each source. Therefore, it is necessary to have what are called "emission factors", which are an estimate of the rate at which a pollutant is released from a source Emission factors are determined scientifically through research using instruments that can monitor the speed of a pollutants release. This workgroup provided an opportunity for the DNR to gain valuable insight and expertise from individuals with technical knowledge in these areas has part of a continuing effort to develop a working understanding of the complex technical issues involved in air quality issues associated with AFOs.

To complete the mission of the workgroup it was necessary to subdivide the workgroup into three smaller workgroups focusing on the areas of air emissions characterization, ambient air modeling, and best

management practices. This report contains a compilation of the findings and recommendations of the three workgroups.

1.2 Process

The initial workgroup meeting was held on February 5th, 2004. Each of the three smaller workgroups consisted of seven to ten individuals, including a group facilitator and technical support staff from the DNR. A list of issues developed by DNR was presented to each workgroup that outlined specific topics that each workgroup was to consider. The workgroups were given the option to further refine the list as the process moved forward. The workgroups met periodically from February through August, 2004. A joint meeting of the workgroups was held on August 11, 2004 to allow the individual workgroups to update each other on their progress and activities. On November 1, 2004, another joint meeting of the workgroups was held to present and discuss comments on a draft of this report. These comments were incorporated as appropriate into a revised draft workgroup report that was issued for workgroup review and comment on November 24, 2004. Comments received on the revised draft workgroup report were reviewed by the workgroup facilitators and technical support staff and incorporated as appropriate into this final report.

1.3 Report Organization

This report summarizes the processes, assumptions, data, and recommendations of each of the three workgroups. Chapter 2 summarizes the findings and recommendations of the Best Management Practices workgroup. Chapters 3 and 4 summarize the findings and recommendations of the Air Emissions Characterization and Dispersion Modeling workgroups, respectively.

Table 1-1

Contributors to the Iowa Department of Natural Resources
Animal Feeding Operations Technical Workgroup

Name	Organization	Workgroup
Banwart, Alan	U.S. EPA Region 7	All
Barton, Charles	Iowa Department of Public Health	Air Emissions
Berhns, Sue	Iowa Air Emissions Assistance Program	BMP
Bundy, Dwaine	Iowa State University	Dispersion Modeling
Bunton, Bryan	Iowa Department of Natural Resources	Dispersion Modeling
Caligiuri, Jim	Izaac Walton League	BMP
Carney, Kari	Iowa Citizens for Community Improvement	Air Emissions
Daniel, Chad	Iowa Department of Natural Resources	Dispersion Modeling
Donham, Kelley	The University of Iowa	BMP
Fitzsimmons, Catharine	Iowa Department of Natural Resources	All
Gieselman, Wayne	Iowa Department of Natural Resources	All
Hamilton, Heather	U.S EPA Region 7	All
Heinzen, Tarah	Sierra Club – Iowa Chapter	Air Emissions
Holm, Thomas	Izaac Walton League	Dispersion Modeling
Kielkopf, Ron	Iowa Citizens for Community Improvement	Air Emissions
Kuper, Marian	Iowa Citizens for Community Improvement	Dispersion Modeling
Lenfert, Carissa	Iowa Citizens for Community Improvement	BMP
McCasland, Jim	Iowa State Association of Counties	Air Emissions
McGraw, Jim	Iowa Department of Natural Resources	All
Nickey, Dan	Iowa Air Emissions Assistance Program	Air Emissions
O'Shaughnessy, Patrick	The University of Iowa	Dispersion Modeling
Pecchia, John	Iowa Department of Natural Resources	BMP
Pfeiffer, Dick	National Soil Tilth Laboratory	Air Emissions
Pins, Mel	Iowa Department of Natural Resources	Air Emissions
Powers, Wendy	Iowa State University	BMP
Schmitz, Stuart	Iowa Department of Public Health	BMP
Slager, Greg	Iowa State Association of Counties	BMP
Smith, Gary	Iowa Department of Natural Resources	BMP
Stein, Marnie	Iowa Department of Natural Resources	Air Emissions
Struckman, Sara	Iowa Citizens for Community Improvement	Dispersion Modeling
Thorne, Peter	The University of Iowa	Air Emissions
Walker-Rains, Wendy	Iowa Department of Economic Development	Dispersion Modeling
Xin, Hongwei	Iowa State University	Air Emissions