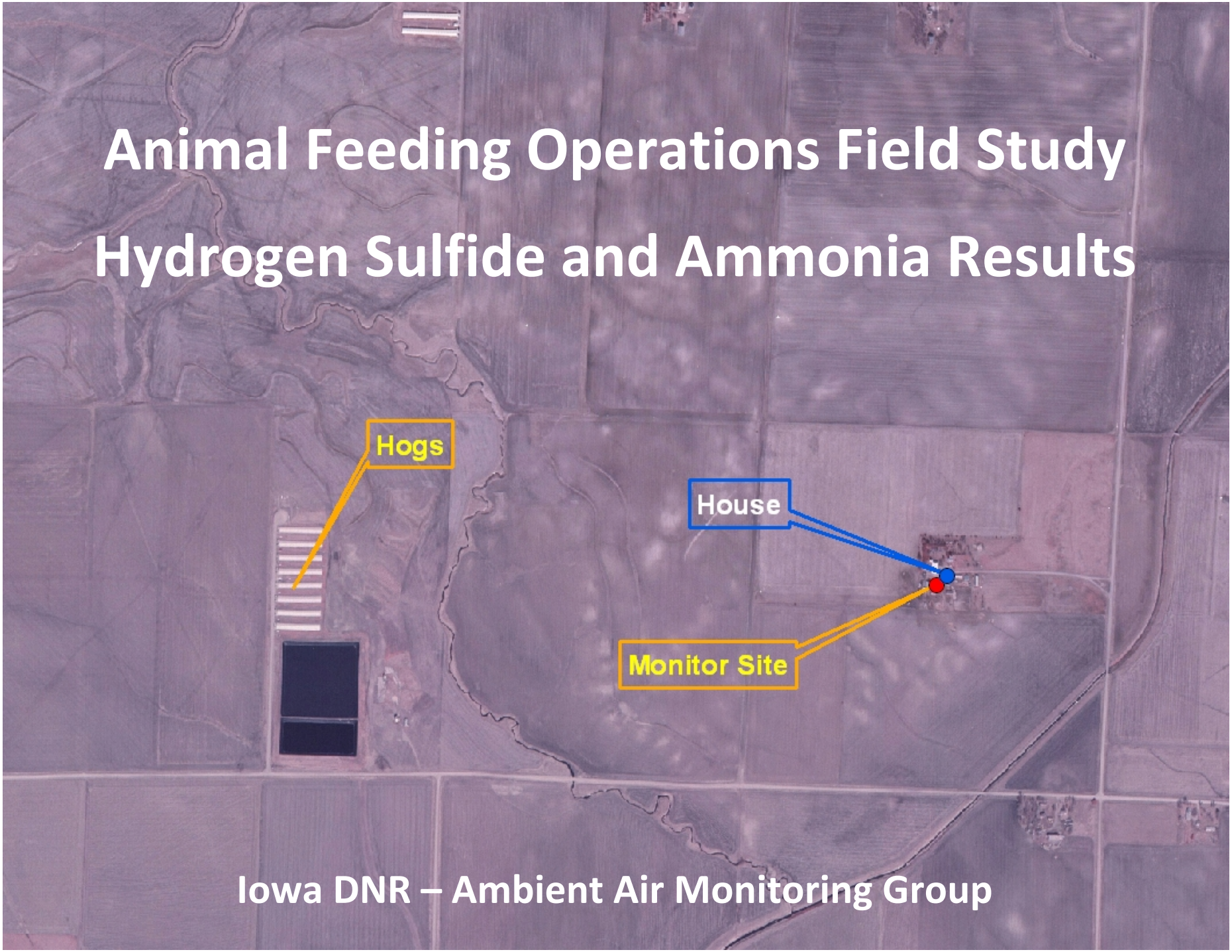
Animal Feeding Operations Field Study

Hydrogen Sulfide and Ammonia Results



Iowa DNR – Ambient Air Monitoring Group

Background

In April 2002, in response to public concerns over air emissions from animal feeding operations[1], the Iowa legislature requested[2] that the department perform a field study of odor, hydrogen sulfide and ammonia levels. Under Iowa law[3], an individual seeking to construct an animal feeding operation over a particular size must build at a minimum specified distance (known as the "separation distance") away from homes, schools and other types of public areas (known as "separated locations"). The field study legislation gave the department authority to implement control measures at animal feeding operations provided the monitoring data showed that pollutant levels at separated locations exceeded health thresholds. The department agreed to use the rulemaking process to establish appropriate monitoring locations and health thresholds for the field study[4].

In September 2004, the department passed a rule establishing the health threshold for hydrogen sulfide.[5] A one hour average of 30 ppb was determined to be the threshold of adverse health effects for hydrogen sulfide, and the regulatory intervention threshold was determined to be an annual eighth highest daily maximum hourly average hydrogen sulfide value of 30 ppb. Monitoring locations were required to be within 100 meters of the separated location (house), and outside the required separation distance that applied at the time the animal feeding operation was constructed.

From 2002 to 2007[6], hydrogen sulfide monitoring was conducted at sixteen locations near CAFOs, seven of these sites recorded hourly averages over the 30 ppb health threshold.

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[1] Two academic reports that analyze these concerns and make specific recommendations for policy development are:

Iowa Concentrated Animal Feeding Operation Air Quality Study, Iowa State University and The University of Iowa Study Group, February 2002: http://www.public-health.uiowa.edu/ehsrc/CAFOstudy.htm .

and: ***Air Emissions from Animal Feeding Operations***, National Academy of Sciences, February 2003: http://www.nap.edu/openbook.php?isbn=0309087058 .

[2] See Iowa Code Section 459.207, reproduced in Appendix A.
[3] See Iowa Code Section 459.202: http://search.legis.state.ia.us/NXT/gateway.dll/2009code/1/15709/15710/16318/16324?f=templates$fn=document-frameset.htm$q=[field%20folio-destination-name:'sec_459_203']$x=Advanced#0-0-0-70487.
[4] Milestones in the development of the rule that identified health thresholds and monitoring locations for the study are contained in Appendix B.
[5] See Iowa Code Section 567—32.1(455B), reproduced in Appendix C.
[6] A chronology of the field study is contained in Appendix E.

Of the sixteen monitoring locations, eleven met the criteria for siting established in the 2004 rulemaking. Five of these eleven sites recorded levels over the 30 ppb health threshold, and one site recorded values over the regulatory intervention threshold.

The single site that recorded values over the regulatory intervention threshold was established prior to the 2004 rulemaking.

Document Overview

Tables summarizing the hydrogen sulfide and ammonia data taken during the field study are contained in the section called **Summary of Completeness and Concentration Data**.

Information concerning monitoring sites is contained in the following sections. The locations where monitoring was conducted for the field study are indicated in the **Map of Site Locations**. The section labeled **Site Description, Aerial Photo, and Graphs** contains additional details about sites where monitoring was conducted during the field study, as well as graphs of monitored concentrations and meteorological data.

The document contains several appendices. **Appendix A** contains the statutory requirements for the field study. **Appendix B** recounts milestones in the development of legislation and rules related to the field study. The rules establishing the thresholds for adverse health effects and regulatory action for hydrogen sulfide are reproduced in **Appendix C. Appendix D** contains the sampling manual for the study adopted as a component of the rulemaking. This manual contains monitor siting requirements and other requirements for monitor operation. A chronology of the field study is contained in **Appendix E**. **Appendix F** presents an account of a two day event at the Goldfield monitoring site, resulting from the application of anhydrous ammonia near the monitoring location. **Appendix G** contains precision and accuracy statistics for hydrogen sulfide and ammonia. The department established goals of ±15% precision and ±20% accuracy for hydrogen sulfide monitoring. The ±15% precision goal was met all of the time. The ±20% accuracy goal was met 65% of the time, and would have been met 96% of the time if the limits were expanded to ±30%.