Appendix D

Iowa Air Sampling Manual

(Version 7/19/04)

This manual contains monitor siting requirements, data handling procedures, approved monitoring methods and equipment, quality assurance requirements, and requirements for public availability of data required to implement the Health Effects Value (HEV) and Health Effects Standard (HES) for hydrogen sulfide (H_2S) as described in Chapter 32 of 567 (455B).

I. Monitor Siting Requirements

Monitoring Sites. For the purposes determining a violation of the HES

1) Monitoring sites shall not be located closer than the legally required separation distance applicable at the time of construction of an animal feeding operations structure.
2) Monitoring data is considered to be taken at a separated location if the monitor is located within 100 meters of the following:
    a) A structure that constitutes the separated location.
    b) The boundary of a public use area.

The department may conduct monitoring at locations that do not meet these requirements with objectives such as the assessment of source contributions, determination of background concentrations or assessment of community exposure.

Flow Obstructions. An object near the monitoring site is defined to be an obstruction if it protrudes above the monitoring probe. If the obstruction is higher than the probe inlet, the monitor must be sited so that the distance from the inlet to the obstruction must be at least twice the height that the obstruction protrudes above the inlet. Trees that represent an obstruction must be farther than 10 meters from the probe.

Probe Inlet Height. The probe inlet at a monitoring site must be from 3 to 15 meters above the ground.

Local Sources. Monitors should be sited to avoid the influences of local sources that may make it difficult to interpret the monitoring data.

Minimum Separation from Roadways. The minimum separation from roadways shall be determined from the following table:

Roadway average daily traffic, vehicles per day	Minimum separation distance[1] (meters)
Less than or equal to 10,000	10
15,000	20
20,000	30
40,000	50
70,000	100
Greater than or equal to 110,000	250

[1]Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count

II. Data Handling Procedures

The Hydrogen Sulfide HEV. The health effects value (HEV) for hydrogen sulfide is 30 parts per billion (ppb) for a one-hour average. An hourly average of 31 ppb is the lowest value that exceeds the hydrogen sulfide HEV. The HEV represents the level of an airborne pollutant commonly known to cause a material and verifiable adverse health effect.

The Hydrogen Sulfide HES. The health effects standard (HES) for hydrogen sulfide is met at a monitoring site when the annual eighth-highest daily maximum hourly average concentration is less than or equal to 30 ppb. An annual eighth-highest daily maximum hourly average of 31 ppb is the lowest value that exceeds the hydrogen sulfide HES. The HES represents the level of an airborne pollutant required to trigger plans and programs to abate emissions of airborne pollutants.

Computation of a Daily Maximum One-hour Average. To determine whether an exceedance of the HEV or HES for hydrogen sulfide has been measured, hourly averages must first be computed. An hourly average is considered valid if at least 45 minutes of valid averages are recorded by the data acquisition system. A sampling day consists of 24 non-overlapping hours beginning from midnight on a given day to midnight on the following day. To determine the daily maximum one-hour average, each of the valid hourly concentrations associated with a sampling day shall be truncated to 1 ppb, and the maximum hourly average value for the sampling day determined. Within this manual, years, days and hours associated with the monitoring data shall be recorded in Central Standard Time (CST), according to the United States Environmental Protection Agency (EPA) convention for continuous monitoring data. Hourly averages are associated with the start hour of the period; for example, an hourly average of the data taken from 1 A.M. to 2 A.M. CST on a given day is associated with the 1 A.M. hour of the day.

Valid Monitoring Days. At a given monitoring site, a day of continuous monitoring data is valid if:
at least 75 percent (%) (18 hours) of valid hourly averages have been recorded, or fewer than 18 valid hourly averages have been recorded, but the maximum hourly average of the available data exceeds 30 ppb. (i.e., a maximum hourly average of 31 ppb or greater)

Comparison of monitoring data with the HES. The HES is met at a monitoring site when the annual eighth-highest daily maximum concentration, expressed in parts per billion, is less than or equal to 30 ppb. The comparison shall be made using the most recent year of monitoring data meeting the data completeness requirements described below. The annual eighth-highest daily maximum 1-hour average concentration shall be expressed in parts per billion (with remaining digits to the right of the decimal point truncated.)

Data Completeness Requirements. The comparison of the monitoring data with the HES shall be based on a complete calendar year of air quality monitoring data.

1. This requirement is met at a monitoring site if daily maximum hourly average concentrations are available for at least 90% of the days of the year, with a minimum data completeness in any calendar quarter of at least 75% of the possible sampling days in the calendar quarter. When computing whether the minimum data completeness requirements have been met, meteorological or ambient data may be sufficient to demonstrate that meteorological conditions on missing days were not conducive to concentrations above the level of the standard. Missing days assumed less than the level of the standard are counted for the purpose of meeting the data completeness requirement, subject to the approval of the Director.
2. A year with concentrations greater than the level of the standard shall not be ignored on the grounds that it has less than complete data. Thus, in computing the eighth highest daily maximum concentration, data from calendar quarters with less than 75% data completeness shall be included in the computation if inclusion of the data results in an annual eighth-highest daily maximum hourly average concentration greater than 30 ppb.

III. Approved Monitoring Methods and Equipment

Hydrogen Sulfide. For comparison with the HEV or HES for hydrogen sulfide, the monitor design must incorporate a thermal oxidizer and an EPA reference method analyzer designed for sulfur dioxide. Instruments that meet this requirement are listed below:

1. Advance Pollution Instrumentation, Model 101A
2. Thermo-Environmental Instruments, Model 45C
3. Thermo-Environmental Instruments, Model 450C or 450CTL
4. Thermo-Environmental Instruments, Model 340 Thermal Converter, operated in conjunction with a Thermo-Environmental Instruments Model 43B, 43C, or 43CTL Sulfur Dioxide Analyzer

IV. Quality Assurance Requirements

Quality Assurance Project Plans and Standard Operating Procedures. Monitors shall be operated in accordance with the quality assurance project plans and standard operating procedures approved by the department.

Precision and Accuracy Assessment. Requirements for assessing the precision and accuracy for H_2S Continuous Analyzers are indicated below:

Method	Assessment	Coverage	Minimum Frequency	Parameters Reported
H2S Analyzer Precision	Response check at 20-40 ppb	Each Analyzer	Once per 2 Weeks	Actual and measured Concentration
H2S Analyzer Accuracy	Response checks at zero and at least 4 of the following points: 0-10 % of full scale 15-25% of full scale 35-50% of full scale 50-70% of full scale 70-90% of full Scale	1. Each Analyzer 2. 25% of analyzers (at least one)	1. Once per year 2. Each calendar Quarter	Actual and measured concentration at each level

Precision and Accuracy Goals. As a goal, the 95% probability limits for precision should be less than ±15%. At 95% probability limits, the accuracy for hydrogen sulfide should be less than ±20%. Calculations of precision and accuracy for hydrogen sulfide will follow the procedures for gaseous pollutants in the United States Code of Federal Regulations (40 CFR Part 58, Appendix A).

V. Public Availability of Data

Hydrogen sulfide data will be uploaded into EPA's publicly available Air Quality System (AQS) database at the same frequency required for federal ambient monitoring data. Monitoring data shall be uploaded to the AQS database within 90 days of the end of the calendar quarter in which the data was taken. Numerical values associated with invalid hourly data due to instrument malfunctions or calibrations will not be entered into AQS; explanations for each hour of missing data will be entered into the database following EPA's guidance for data coding.