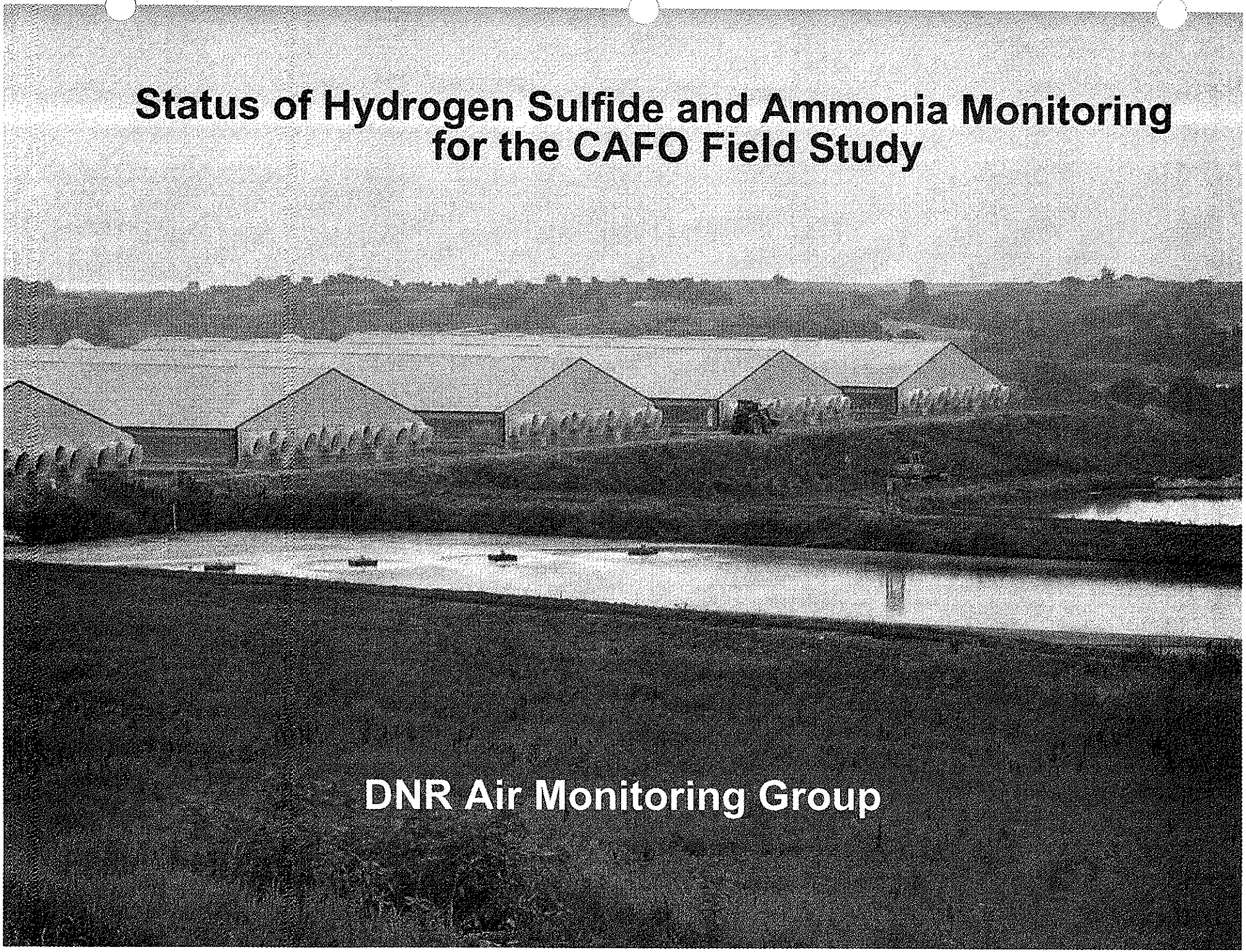
Status of Hydrogen Sulfide and Ammonia Monitoring for the CAFO Field Study



DNR Air Monitoring Group

Iowa Code Section 459.207

Animal Feeding Operations -- Airborne Pollutants Control.

1. As used in this section, unless the context otherwise requires:

a. "Airborne pollutant" means hydrogen sulfide, ammonia, or odor.

b. "Separated location" means a location or object from which a separation distance is required under section 459.202 or 459.204, other than a public thoroughfare.

2. The department shall conduct a comprehensive field study to monitor the level of airborne pollutants emitted from animal feeding operations in this state, including but not limited to each type of confinement feeding operation structure.

3. a. After the completion of the field study, the department may develop comprehensive plans and programs for the abatement, control, and prevention of airborne pollutants originating from animal feeding operations in accordance with this section. The comprehensive plans and programs may be developed if the baseline data from the field study demonstrates to a reasonable degree of scientific certainty that airborne pollutants emitted by an animal feeding operation are present at a separated location at levels commonly known to cause a material and verifiable adverse health effect. The department may adopt any comprehensive plans or programs in accordance with chapter 17A prior to implementation or enforcement of an air quality standard but in no event shall the plans and programs provide for the enforcement of an air quality standard prior to December 1, 2004.

b. Any air quality standard established by the department for animal feeding operations shall be based on and enforced at distances measured from a confinement feeding operation structure to a separated location. In providing for the enforcement of the standards, the department shall take all initial measurements at the separated location. If the department determines that a violation of the standards exists, the department may conduct an investigation to trace the source of the airborne pollutant. This section does not prohibit the department from entering the premises of an animal feeding operation in compliance with section 455B.103. The department shall comply with standard bio-security requirements customarily required by the animal feeding operation which are necessary in order to control the spread of disease among an animal population.

c. The department shall establish recommended best management practices, mechanisms, processes, or infrastructure under the comprehensive plans and programs in order to reduce the airborne pollutants emitted from an animal feeding operation.

d. The department shall provide a procedure for the approval and monitoring of alternative or experimental practices, mechanisms, processes, or infrastructure to reduce the airborne pollutants emitted from an animal feeding operation, which may be incorporated as part of the comprehensive plans and programs developed under this section.

Adopted April 29, 2002

Chapter 32-Animal Feeding Operations Field Study

567—32.1(455B) Animal feeding operations field study. The department shall conduct a field study to measure the levels of hydrogen sulfide, ammonia and odor near animal feeding operations as defined in 567—65.1(455B).

567—32.2(455B) Definitions. For the purposes of this chapter, the following terms shall have the meaning indicated in this chapter.

"Health effects standard" means the level of an airborne pollutant required to trigger plans and programs to abate emissions of airborne pollutants.

"Health effects value" means the level of an airborne pollutant commonly known to cause a material and verifiable adverse health effect.

"Separated location" means a location or object from which a separation distance is required under Iowa Code sections 455B.134, 459.202 or 459.204, other than a public thoroughfare.

567—32.3(455B) Exceedance of the Health Effects Value (HEV) for Hydrogen Sulfide. The health effects value for hydrogen sulfide is exceeded at a monitoring site when the one–hour average concentration exceeds 30 ppb.

567—32.4(455B) Exceedance of the Health Effects Standard (HES) for Hydrogen Sulfide. The health effects standard for hydrogen sulfide is exceeded at a monitoring site when the daily maximum one–hour average concentration exceeds 30 ppb more than seven times per year. The department shall develop plans and programs to abate hydrogen sulfide emissions from animal feeding operations if hydrogen sulfide levels measured at a separated location exceed the health effects standard for hydrogen sulfide.

567—32.5(455B) Iowa Air Sampling Manual. Monitor siting requirements, data handling procedures, approved monitoring methods and equipment, quality assurance requirements, and requirements for public availability of the data for determining compliance with the HEV or HES for hydrogen sulfide shall be in accordance with the Iowa Air Sampling Manual* adopted by the commission on July 19, 2004, and adopted by reference herein.

These rules are intended to implement Iowa Code sections 459.207 and 455B.133.

*Available from the department.

[Filed 7/29/04, effective 9/22/04]

Siting Requirements from the Sampling Manual

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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.

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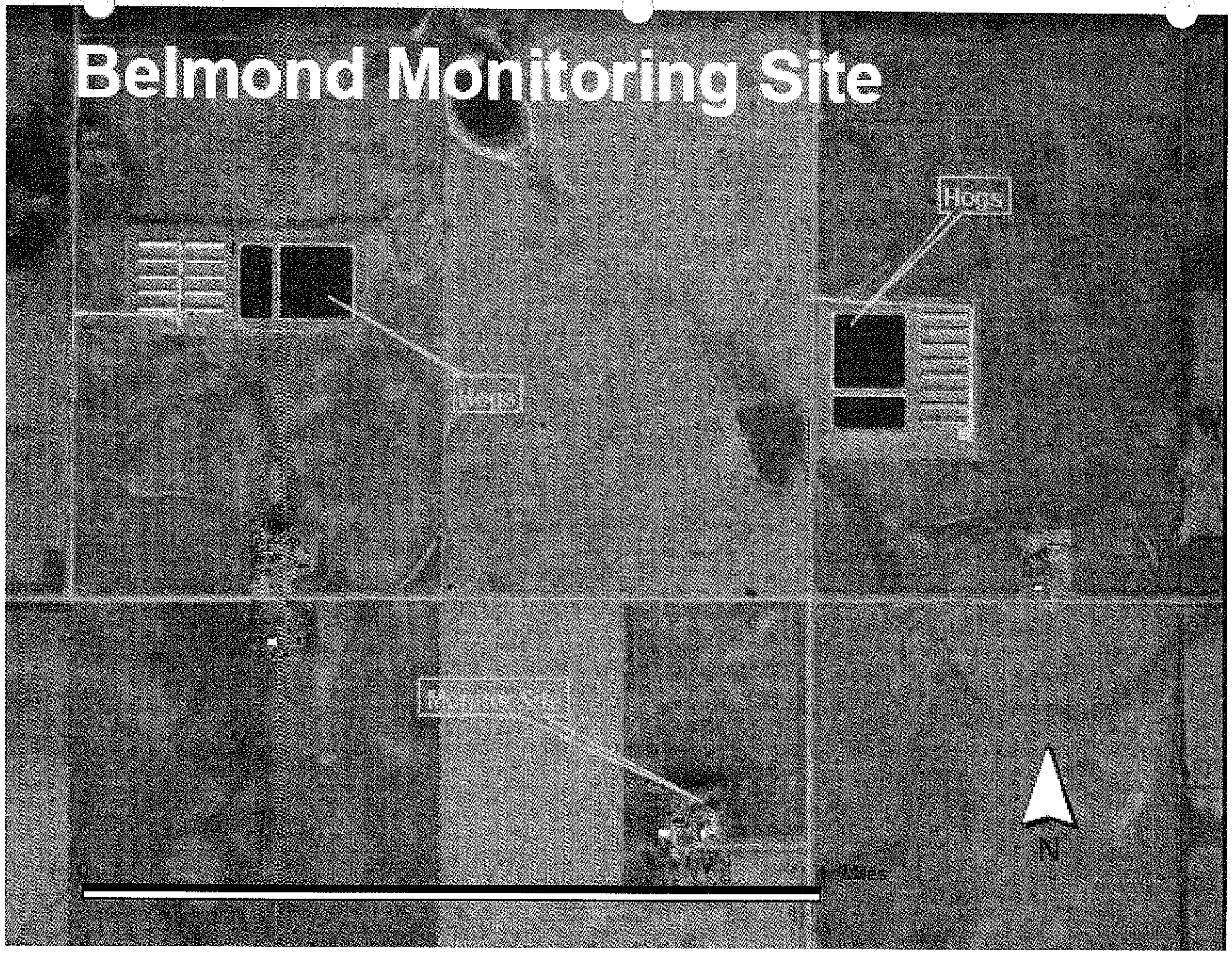
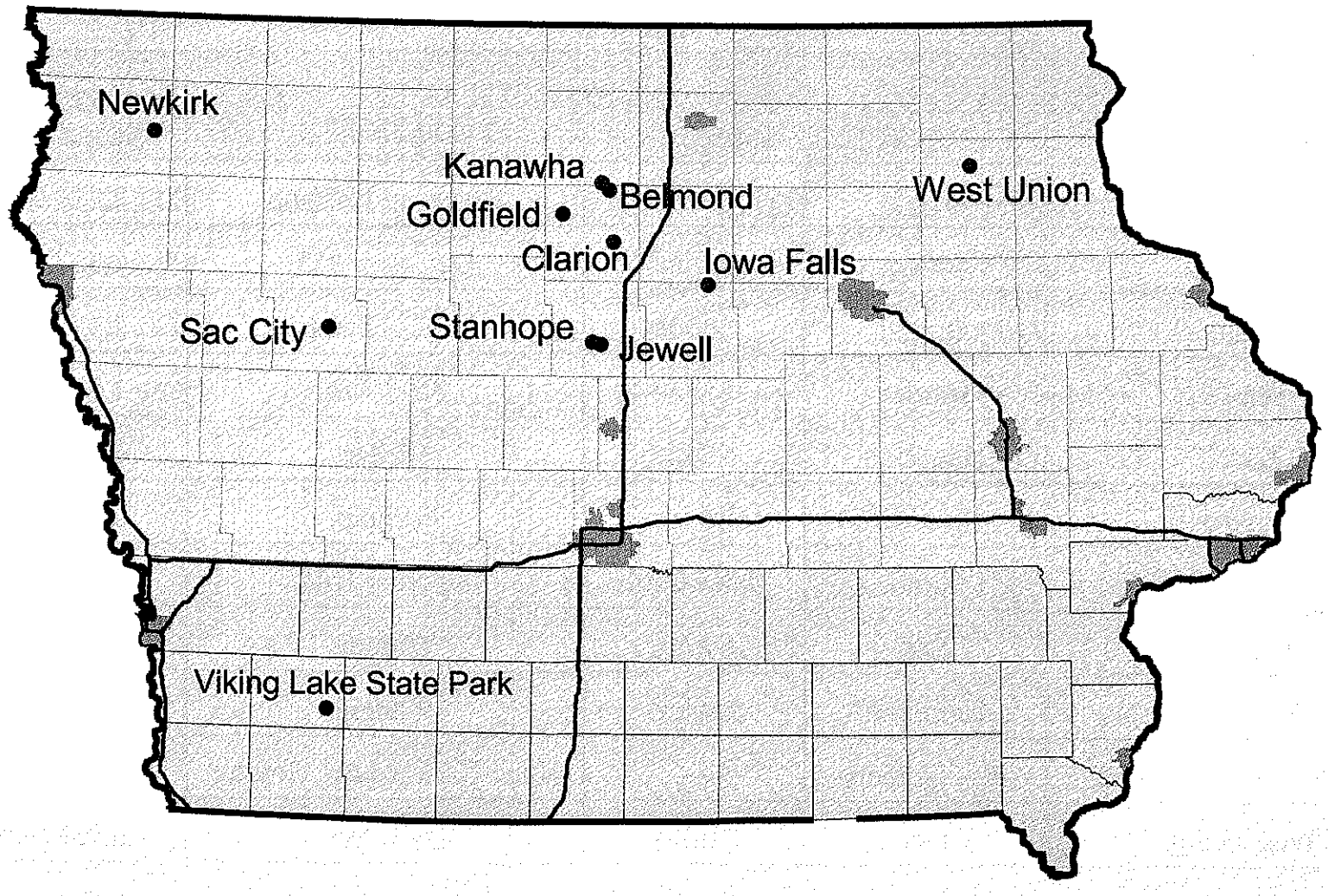

Belmond Monitoring Site
Hogs
Hogs
Monitor Site
N
0
1 Miles

CAFO Monitoring Sites

Nearby Town	County	Animal Type	Closest Facility	Permitted Weight in lbs.
Belmond	Wright	Swine	Buseman/Halfpop	2,310,000
Clarion	Wright	Swine	DeCoster #15	1,827,265
Goldfield	Wright	Swine	McCutcheon	2,475,000
Iowa Falls	Hardin	Swine	Stockdale	1,502,500
Jewell	Hamilton	Swine	Miller	1,462,500
Kanawha	Hancock	Swine	Fishjohn	2,310,000
Newkirk	Sioux	Dairy Cattle	Hickory Hills	2,390,000
Sac City	Sac	Swine	Withum	1,890,000
Stanhope	Hamilton	Swine	Winniger	2,475,000
Stanton (Viking Lake)	Montgomery	---	None-Background Monitor	---
West Union	Fayette	Poultry	IVA Inc	3,030,000

Current CAFO Network



Ammonia

2004 Hourly Summary Statistics

Statistic/Site Name	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	Stanton	West Union
Total Hours	4366	8173	7512	5114	3680	4354	3367	4519	4406	8041	4144
Capture Percentage	50%	93%	86%	58%	42%	50%	38%	51%	50%	92%	47%
Minimum (ppb)	0	0	0	0	0	0	0	0	0	0	0
Maximum (ppb)	481	974	905	607	690	252	316	391	1751	284	589
Average (ppb)	11	26	22	45	50	12	7	22	39	3	11

Percentile	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	Stanton	West Union
100%	481	974	905	607	690	252	316	391	1751	284	589
90%	26	59	47	81	97	30	15	51	76	8	20
80%	15	34	34	66	71	17	9	37	57	5	16
70%	10	24	26	58	57	12	6	28	45	4	13
60%	7	17	21	49	48	8	4	21	36	2	12
50%	5	13	16	41	41	5	2	16	30	0	10
40%	3	9	12	31	34	3	2	12	23	0	8
30%	2	6	8	23	28	1	0	8	16	0	6
20%	0	4	5	16	22	0	0	3	11	0	4
10%	0	1	1	7	7	0	0	0	6	0	0

Maximum	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	Stanton	West Union
1	481	974	905	607	690	252	316	391	1751	284	589
2	427	610	636	481	587	250	264	344	950	222	451
3	329	604	508	475	402	248	245	241	797	215	233
4	270	569	421	432	366	237	228	241	760	198	229
5	251	565	405	415	363	222	226	204	746	188	188
6	240	561	396	408	332	216	213	196	622	160	160
7	227	539	392	382	323	202	205	192	614	66	123
8	204	516	344	367	316	200	198	182	508	63	106
9	202	500	334	326	305	190	175	170	448	62	99
10	178	466	309	317	296	185	157	166	365	61	94

Ammonia

2005 Hourly Summary Statistics

Statistic/Site Name	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	Stanton	West Union
Total Hours	8610	7853	8299	8431	8581	8341	8613	8598	8615	8450	8574
Capture Percentage	98%	90%	95%	96%	98%	95%	98%	98%	98%	96%	98%
Minimum (ppb)	0	0	0	0	0	0	0	0	0	0	0
Maximum (ppb)	476	508	783	427	876	548	730	317	1045	110	454
Average (ppb)	12	21	11	26	20	15	12	11	21	3	15

Percentile	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	Stanton	West Union
100%	476	508	783	427	876	548	730	317	1045	110	454
90%	23	44	24	46	35	34	22	26	37	7	29
80%	16	28	15	35	25	22	15	17	28	5	20
70%	13	21	11	29	21	15	12	13	22	4	16
60%	10	16	8	26	18	11	9	10	19	3	13
50%	8	12	6	23	16	8	8	7	15	2	10
40%	6	9	5	20	14	6	6	5	12	2	8
30%	5	6	4	17	11	4	4	3	10	1	6
20%	3	4	2	12	9	2	3	1	7	0	4
10%	2	2	0	8	6	0	2	0	4	0	2

Maximum	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	Stanton	West Union
1	476	508	783	427	876	548	730	317	1045	110	454
2	353	478	761	385	721	393	721	250	860	100	367
3	274	466	702	319	705	383	707	203	787	60	329
4	270	466	375	289	480	363	682	201	763	49	322
5	268	438	368	280	387	340	636	181	754	39	303
6	255	434	288	279	346	302	634	178	742	38	273
7	253	430	255	272	298	290	624	170	604	35	262
8	252	409	247	268	296	278	511	169	561	34	241
9	229	403	210	260	276	261	495	168	559	32	241
10	225	402	208	243	276	242	456	166	523	31	235

Ammonia

2006 Hourly Summary Statistics

Statistic/Site Name	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	Stanton	West Union
Total Hours	8630	8641	8625	8600	8534	8620	8576	8612	8592	7691	8150
Capture Percentage	99%	99%	98%	98%	97%	98%	98%	98%	98%	88%	93%
Minimum (ppb)	0	0	0	0	0	0	0	0	0	0	0
Maximum (ppb)	181	551	539	286	996	315	279	396	1821	44	931
Average (ppb)	11	20	12	16	19	12	11	10	16	3	15

Percentile	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	Stanton	West Union
100%	181	551	539	286	996	315	279	396	1821	44	931
90%	19	45	23	26	34	27	23	23	27	7	29
80%	15	27	16	21	24	19	16	16	20	5	15
70%	12	20	12	18	20	14	12	11	17	4	10
60%	11	15	10	16	17	11	10	8	14	3	8
50%	9	11	8	14	15	8	8	5	12	2	6
40%	8	8	7	12	13	6	7	3	10	1	5
30%	6	6	5	11	11	4	5	2	9	1	3
20%	5	4	4	9	9	2	4	0	6	0	2
10%	2	2	2	6	6	0	2	0	4	0	0

Maximum	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	Stanton	West Union
1	181	551	539	286	996	315	279	396	1821	44	931
2	145	445	389	284	762	258	263	285	1178	40	805
3	138	429	356	259	716	236	259	262	708	39	800
4	127	424	317	213	713	203	159	247	649	39	765
5	120	407	298	197	694	197	157	246	424	37	762
6	118	374	296	194	673	188	140	239	412	37	589
7	102	352	267	193	666	188	138	235	375	35	573
8	96	345	264	170	398	187	132	212	367	34	459
9	93	338	251	168	344	176	132	202	331	33	456
10	93	336	244	159	333	171	132	183	310	32	410

Hydrogen Sulfide

2004 Hourly Summary Statistics

Statistic/Site Name	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	West Union
Total Hours	4410	8693	6392	5829	3523	4200	4090	4210	5302	4361
Capture Percentage	50%	99%	73%	66%	40%	48%	47%	48%	60%	50%
Minimum (ppb)	0	0	0	0	0	0	0	0	0	0
Maximum (ppb)	11	17	9	8	5	15	25	11	20	2
Average (ppb)	0	0	0	0	0	0	0	0	0	0

Percentile	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	West Union
100%	11	17	9	8	5	15	25	11	20	2
90%	1	1	1	0	0	1	1	0	1	0
80%	0	1	0	0	0	0	0	0	0	0
70%	0	0	0	0	0	0	0	0	0	0
60%	0	0	0	0	0	0	0	0	0	0
50%	0	0	0	0	0	0	0	0	0	0
40%	0	0	0	0	0	0	0	0	0	0
30%	0	0	0	0	0	0	0	0	0	0
20%	0	0	0	0	0	0	0	0	0	0
10%	0	0	0	0	0	0	0	0	0	0

Maximum	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	West Union
1	11	17	9	8	5	15	25	11	20	2
2	9	14	9	7	4	7	25	9	16	1
3	9	14	8	6	4	7	25	9	13	1
4	7	13	8	5	4	7	18	8	12	0
5	6	12	7	5	3	7	16	8	11	0
6	6	12	6	5	3	7	15	8	10	0
7	6	10	5	5	3	6	13	8	8	0
8	6	10	5	5	3	6	13	7	8	0
9	5	9	5	5	3	6	12	7	7	0
10	5	9	5	5	3	6	12	7	7	0

Hydrogen Sulfide

2005 Hourly Summary Statistics

Statistic/Site Name	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	West Union
Total Hours	7855	7533	8383	8681	8650	8208	8299	8351	8695	8672
Capture Percentage	90%	86%	96%	99%	99%	94%	95%	95%	99%	99%
Minimum (ppb)	0	0	0	0	0	0	0	0	0	0
Maximum (ppb)	8	18	9	16	32	11	143	19	24	2
Average (ppb)	0	0	0	0	0	0	0	0	0	0

Percentile	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	West Union
100%	8	18	9	16	32	11	143	19	24	2
90%	0	1	1	0	1	1	1	1	1	0
80%	0	1	0	0	0	1	0	0	0	0
70%	0	0	0	0	0	0	0	0	0	0
60%	0	0	0	0	0	0	0	0	0	0
50%	0	0	0	0	0	0	0	0	0	0
40%	0	0	0	0	0	0	0	0	0	0
30%	0	0	0	0	0	0	0	0	0	0
20%	0	0	0	0	0	0	0	0	0	0
10%	0	0	0	0	0	0	0	0	0	0

Maximum	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	West Union
1	8	18	9	16	32	11	143	19	24	2
2	7	15	8	12	31	7	47	15	23	2
3	7	14	8	12	31	7	45	14	23	1
4	7	14	7	11	24	6	36	13	21	1
5	7	13	7	10	22	6	27	13	20	1
6	6	13	7	9	21	6	27	11	19	1
7	6	12	7	8	20	6	25	11	19	1
8	6	11	7	7	19	6	23	11	19	1
9	6	11	6	7	18	6	23	10	19	1
10	6	10	6	6	18	6	22	10	18	1

Hydrogen Sulfide

2006 Hourly Summary Statistics

Statistic/Site Name	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	West Union
Total Hours	8651	8685	8451	8427	8087	8677	8378	8392	8664	8699
Capture Percentage	99%	99%	96%	96%	92%	99%	96%	96%	99%	99%
Minimum (ppb)	0	0	0	0	0	0	0	0	0	0
Maximum (ppb)	6	25	7	13	28	7	40	51	33	3
Average (ppb)	0	0	0	0	0	0	0	0	0	0

Percentile	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	West Union
100%	6	25	7	13	28	7	40	51	33	3
90%	0	1	0	0	1	1	1	1	1	0
80%	0	0	0	0	0	0	1	0	0	0
70%	0	0	0	0	0	0	1	0	0	0
60%	0	0	0	0	0	0	0	0	0	0
50%	0	0	0	0	0	0	0	0	0	0
40%	0	0	0	0	0	0	0	0	0	0
30%	0	0	0	0	0	0	0	0	0	0
20%	0	0	0	0	0	0	0	0	0	0
10%	0	0	0	0	0	0	0	0	0	0

Maximum	Belmond	Clarion	Goldfield	Iowa Falls	Jewell	Kanawha	Newkirk	Sac City	Stanhope	West Union
1	6	25	7	13	28	7	40	51	33	3
2	5	16	6	12	24	7	38	23	25	3
3	5	11	6	12	20	7	29	18	21	3
4	5	7	5	11	19	6	28	17	13	2
5	4	6	5	8	19	6	28	16	12	2
6	4	6	5	8	19	6	28	16	12	2
7	4	6	5	8	17	6	26	16	11	2
8	4	6	5	8	12	6	25	14	10	2
9	4	6	5	7	12	6	25	13	9	2
10	4	6	5	7	12	6	23	12	9	2

HEV Exceedances by Year

Year	Number of HEV Exceedances	Comments
2004	0	Partial Year
2005	7	Newkirk(4), Jewell(3)
2006	4	Newkirk(2), Sac City(1), Stanhope (1)

Summary

- The department has operated hydrogen sulfide and ammonia monitors near 10 large animal feeding operations since the middle of 2004.
- Levels exceeding the threshold for adverse health effects hydrogen sulfide (HEV) have been recorded at four sites; no sites have recorded levels exceeding the threshold for regulatory intervention (HES).
- Health thresholds for ammonia have not been established.
- To average over variability in meteorology and emissions, EPA typically uses a minimum of three calendar years of data to determine if a monitoring location meets an ambient air quality standard.
- If funding for CAFO monitoring is allocated for this State Fiscal Year then three complete calendar years of data will be available for the 10 CAFO sites.

For Additional Information

http://www.iowadnr.com/air/afo/afo.html

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