Technical Support Document

Response to EPA's Proposed $PM_{2.5}$ Nonattainment Boundaries for Scott County, Iowa, and Rock Island County, Illinois and Muscatine County, Iowa

October 20, 2008

Iowa Department of Natural Resources
Environmental Services Division
Air Quality Bureau
7900 Hickman Rd Suite 1
Urbandale, IA 50322

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I. Introduction

On August 18, 2008, the U.S. Environmental Protection Agency (EPA) notified the State of Iowa of their intent to modify the State's recommendations for designating areas as nonattainment for the 2006 24-hour $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS). Iowa has carefully reviewed EPA's proposed PM 2.5 designations and technical support documents and provides in this document specific comments on EPA's reasons for modifications including significant supplements and refinements to the technical information provided in Iowa's May 30, and July 29, 2008 submittals, and technical information transmitted electronically to EPA on July 2 and 3, 2008.

In response to EPA comments Iowa herein provides extensive documentation supporting limited sub-county boundaries for nonattainment areas in both Scott and Muscatine Counties.

Using a collaborative approach, Iowa Department of Natural Resources (IDNR), Illinois EPA (IL EPA), and U.S. EPA Region 7 (EPA Region 7) have completed several analyses to investigate the questions raised in EPA's proposal. The analyses include:

1. Local scale impact assessments using a dispersion model,
2. Regional scale contribution assessments using a photochemical grid model,
3. Further analysis of elements of the 9-Factor Analysis.

These methods provide information useful in assessing how $PM_{2.5}$ concentrations are apportioned across various scales, from contributions attributable to a single source at the local scale to the cumulative impacts of many sources at the regional scale. Regional modeling techniques are used to investigate the role of NOx and SO_2 precursor gases. The results of all these analyses generate a weight-of-evidence evaluation that provides the information necessary to address EPA's concerns.

In summary, the following sections of this document will address the issues that led EPA to propose county or multi-county nonattainment areas, and will subsequently provide sufficient information to show what portion of the PM 2.5 contribution to each of the two violating monitors is attributable to the nearby sources, longer range transport, and the limited extent other metro area sources play a role. In this technical support document (TSD) Iowa also looks at the monitoring trends across the network in order to provide a comprehensive understanding of the nature of the monitored exceedances. $PM_{2.5}$ precursor emissions of SO_2 and NOx in the counties are analyzed to show the limited extent to which other sources of pollutants are contributing to exceedance events. The cumulative weight-of-evidence will demonstrate conclusively that local sources controlled expeditiously will quickly bring the small area near the violating monitors back into attainment with the $PM_{2.5}$ NAAQS , and thus support nonattainment boundaries which are confined to limited areas in Scott and Muscatine Counties.

II. Proposed Boundaries

The weight of evidence clearly supports sub-county scale boundaries in both Scott and Muscatine counties and convincingly argues for the complete exclusion of Rock Island County. These conclusions are based on the reevaluation of the information previously generated as part of the nine factor analysis and additional analysis results as discussed in this document. The sub-county boundaries would include sources that will be important to resolving the air quality issues in the areas of concern, while at the same time protecting the health of individuals in the area where the standard has been violated.

All of the nine factors were considered by IDNR in the determination of the boundaries. Air quality data, emissions inventory information, meteorology, and the modeling analysis results were given the most weight. This approach is justified as the air quality, emissions, and meteorological factors form the basis in developing the conceptual picture of conditions which lead to the violation of the $PM_{2.5}$ standard at both of the violating monitor locations.

<u>Proposed Scott County Boundaries</u>

The proximity of the monitors attaining the standard at Adams School and 10th & Vine to the violating monitor at Blackhawk clearly highlights the importance of local sources. The meteorological and emissions data reveal that local exceedances of the NAAQS at the Blackhawk monitor result from direct $PM_{2.5}$ emissions originating from Blackhawk Foundry. Modeling and data analysis results support these findings and provide additional insight into where the appropriate boundaries should be drawn. Modeling analyses completed using AERMOD and representative meteorological data from the Quad Cities Airport for the periods 2000-2004 and 2003-2007 were used to help determine where the appropriate boundaries should be drawn.

The recommended nonattainment boundaries for Scott County are provided in Figure 1. The streets/highways that define the recommended boundaries are as follows:
Northern Boundary = West Locust Street, to:
Western Boundary = North Utah Avenue / South Utah Avenue
Southern Boundary = U.S. Highway 61 (locally known as West River Drive), to:
Eastern Boundary = Schmidt Road, to Rockingham Road, to South Pine Street, to North Pine Street, to West 3rd Street, to Waverly Road, ending at West Locust Street

<u>Proposed Muscatine County Boundaries</u>

For Muscatine County, the proximity of the violating monitor to two of the largest direct $PM_{2.5}$ sources in the county suggests the importance of local sources. Cumulatively the analysis reveals that local exceedances, which yielded the two highest daily averaged $PM_{2.5}$ concentrations over the past 3 years, of the NAAQS at the Garfield School monitor result from emissions originating from Grain Processing Corporation. Modeling analyses completed using AERMOD and representative meteorological data from the Cedar Rapids Airport for the periods 2000-2004 and 2003-2007 support these findings and were used to help determine where the appropriate boundaries should be drawn.

The recommended nonattainment boundaries for Muscatine County are provided in Figure 2. The streets/highways that define the recommended boundaries are as follows:
Northern Boundary = Lucas Street, to:
Western Boundary = U.S. Highway 61; at the intersection of U.S. Highway 61 and State Highway 92, the western boundary extends south to 41st Street South, to:
Southern Boundary = 41st Street South, to:
Eastern Boundary = Western edge of the Mississippi River up to the point southeast of the intersection of Green Street and Mill Street, to Green Street (ending with Lucas Street)

Considering All Factors:

IDNR's proposed non-attainment area recommendation

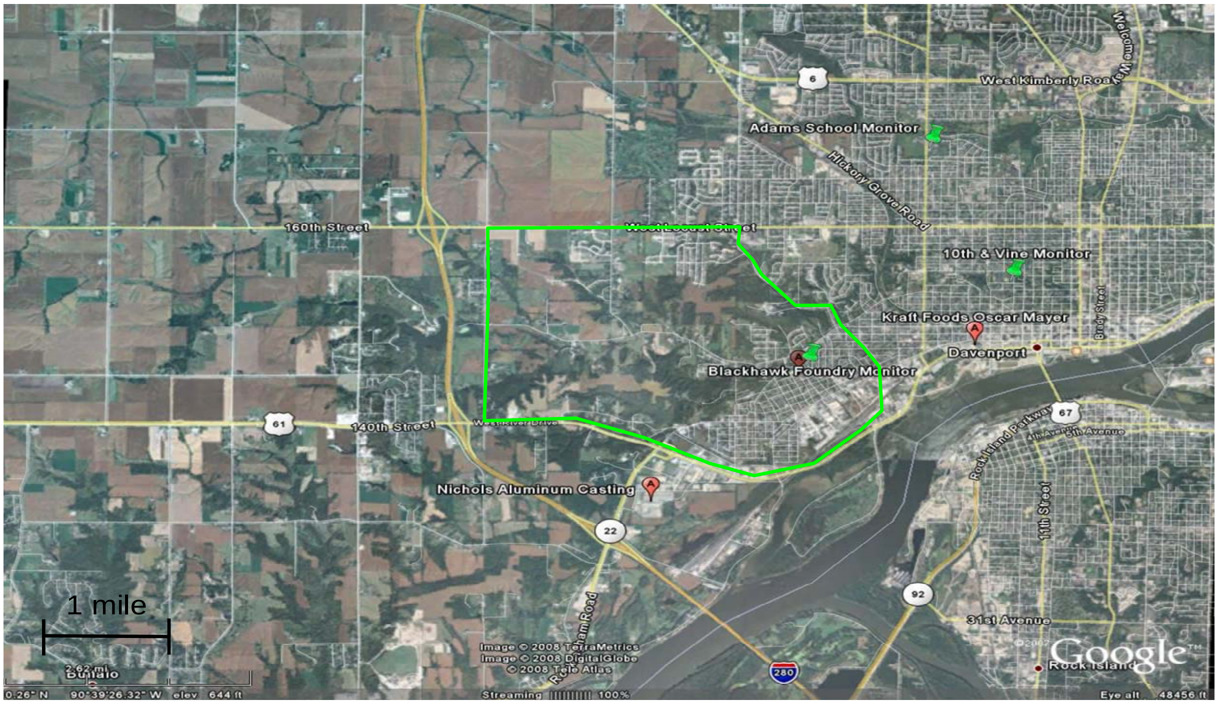

Figure 1. Recommended nonattainment boundary for Scott County.

Considering All Factors:

IDNR's proposed non-attainment area recommendation

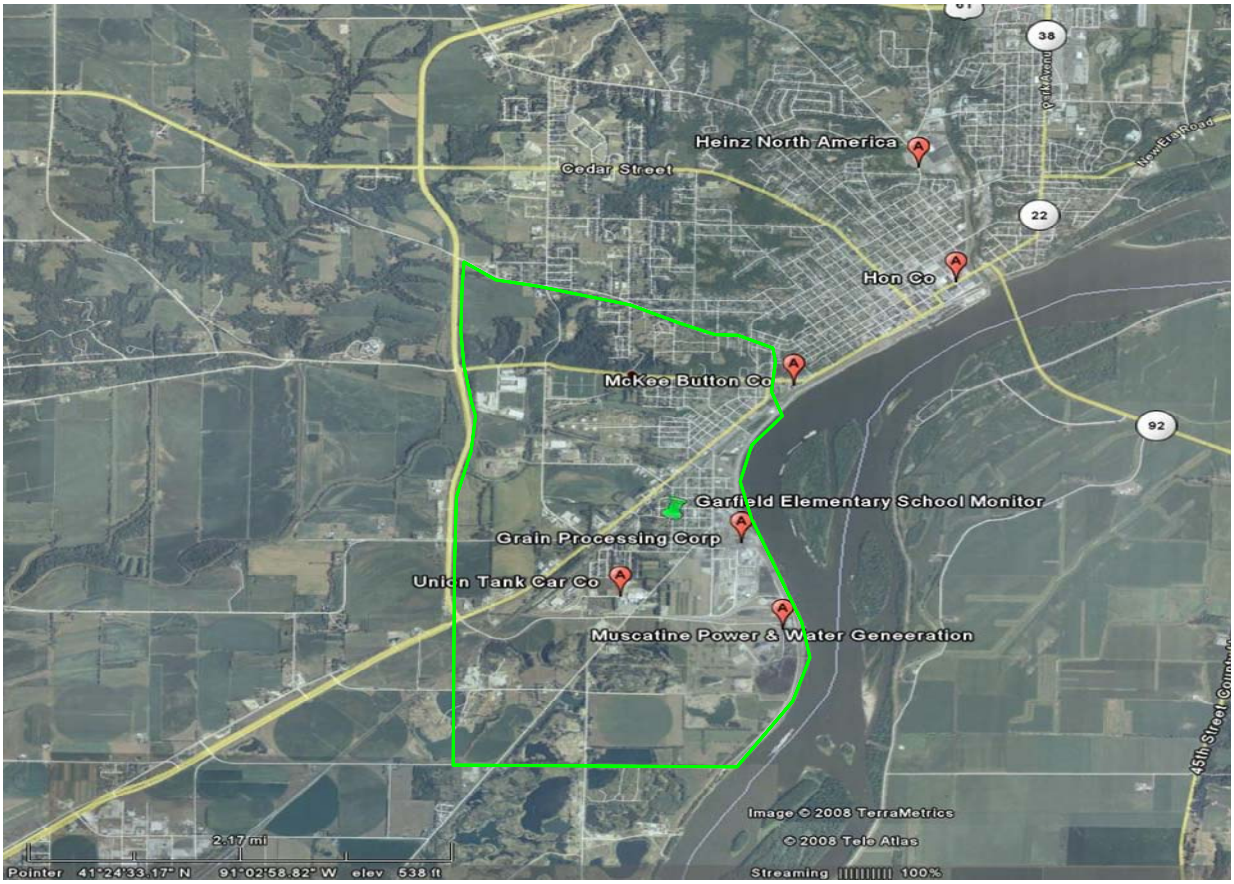

Figure 2. Recommended nonattainment boundary for Muscatine County.

III. Technical Analyses

A. Ambient Monitoring Sites and Data Characterization

1. Overview

The 1409 Wisconsin monitor, known as the Garfield School monitor, is located approximately 500 meters from sources at Grain Processing Corporation (GPC) in Muscatine County (see Figure 3). The 300 Wellman Street monitor, known as the Blackhawk Foundry monitor, is located approximately 150 meters from the Cupola stack at Blackhawk Foundry in Scott County (see Figure 4 and Figure 5). These monitors are both located in residential areas inside of the respective city limits and represent ambient concentrations of pollutants for those areas.

Figure 3. Grain Processing Corporation (GPC) and Muscatine Power and Water. The monitor at Garfield School is located 1,700 yards Northwest of Muscatine Power (bearing of 327°). The monitor is also 652 yards West of GPC (bearing of 282.5°).

Figure 4. Blackhawk Foundry and its nearest monitor. The Davenport Blackhawk Foundry monitor is located 180 yards northeast the foundry (bearing of 40.5°).

Figure 5. Monitors in the Davenport area. The Davenport Blackhawk Foundry monitor is located 180 yards northeast the foundry (bearing of 40.5°). The Jefferson School monitor is located 3376 yards northeast of the Foundry (bearing of 60°). The Adams School Monitor is located 4507 yards northeast of the Foundry (bearing of 23°). The monitor on Arsenal Island is 9437 yards due east of the Foundry (bearing of 90°).

2. Summary of Monitoring Data

Maps of $PM_{2.5}$ 24-hour design values for the period 2005 through 2007, for monitoring sites with data completeness that is adequate for attainment demonstrations are contained in Appendix A. Design values greater than 35 $\mu g/m^3$ violate the 24 hour $PM_{2.5}$ standard. The violating monitors in Iowa lie on the western edge of a region of poor air quality associated with the industrial Midwest. Design values in the industrial Midwest are typically above 30 $\mu g/m^3$ (owing to regional fine particle episodes) even at monitoring locations that are away from major cities. Design values decline moving west into the Great Plains and north toward Canada.

Maps of monitored FRM concentrations across the Western Great Plains and Midwest (EPA Regions 5 and 7) on each of the days when the Davenport, Blackhawk Foundry monitor recorded an exceedance are contained in Appendix B. An exceedance day is a day when an FRM sampler records a value greater than 35.5 $\mu g/m^3$. There are exceedance days at the Blackhawk Foundry monitor when other monitors in the surrounding region record considerably lower values. This suggests that there is a source near the Blackhawk Foundry monitor of sufficient strength to generate an exceedance even in the absence of a regional fine particle episode.

Maps of monitored FRM concentrations across the Western Great Plains and Midwest (EPA Regions 5 and 7) on each of the days when the Muscatine, Garfield School monitor recorded an exceedance are contained in Appendix C. There are exceedance days at the Garfield School monitor when other monitors in the surrounding region record considerably lower values. This suggests that there is a source near the Garfield School monitor of sufficient strength to generate an exceedance even in the absence of a regional fine particle episode.

The results of an analysis associating the difference between the $PM_{2.5}$ FRM samplers at Jefferson School and Blackhawk Foundry with wind direction are provided in Appendix D. This analysis establishes that the daily difference between the two monitors tends to be greatest on days containing hours when the wind blows from the direction of the foundry.

Pollution roses developed from continuous $PM_{2.5}$ monitoring data from the violating site located near Blackhawk Foundry and a community oriented monitor near Jefferson School in Davenport are provided in Appendix E. Continuous monitors are not FRM monitors and the continuous monitoring data is frequently normalized with FRM data in order to provide values that approximate FRM values for real time reporting applications. Both the normalized and unnormalized pollution roses at the Blackhawk Foundry monitoring site show elevated fine particulate values when the wind blows from the direction of the Blackhawk Foundry. One can analyze the difference between unnormalized or normalized data from the two sites for hours when the Black Hawk Foundry monitor reads higher than the Jefferson School monitor. The greatest difference in pollutant concentration between the two sites occurs when the wind blows from the direction of the foundry.

The difference between the fine particle concentrations recorded on violating monitors in Iowa and nearby monitors is explored in Appendices F, G, and H. "Nearby monitors" are defined to be monitors with complete data (suitable for establishing attainment) lying inside a circle with a diameter of about 100 miles centered on the Quad Cities. A demonstration that the design values of nearby monitors are less than those at the violating monitor is given in Appendix F. The difference between the violating monitor and nearby monitors on exceedance days at each of the two violating monitors is quantified in Appendix G. Histograms exhibiting the differences in fine particle concentration between the violating monitor and nearby monitors are provided in Appendix H. Each of these three analyses are consistent with the hypothesis that a local source near the violating sites gives rise to elevated pollutant concentrations relative to nearby monitors, and help to quantify the magnitude of the local component of each exceedance.

In addition, Appendices I and J compare the results of chemical analysis from specially designed speciation samplers with those from archived filters from ordinary (FRM) samplers collected at the same monitoring location. It was hoped that the measurements would show excellent agreement, so that archived FRM filters could be used to provide an accurate assessment of the ionic or metallic chemical constituents of fine particles at any monitoring location where there was an FRM sampler. If comparability could be demonstrated, then chemical analysis of archived FRM filters might shed light on the differences in chemical composition of fine particles near sources and away from sources. Unfortunately, the results of the comparability study showed considerable variability between the chemical analyses performed on the filter media from two different samplers at the same monitoring location. The magnitude of this variability was sufficient that the department determined that the data quality associated with chemical analysis of archived FRM filters was not adequate to provide useful information to decision makers in establishing attainment boundaries.

B. Nearby Source Contribution Assessments

1. Summary

Major stationary sources located in close proximity to ambient air monitors showing violations of the $PM_{2.5}$ 24-hour ambient air quality standard are shown to contribute to those violations. Dispersion modeling was used to quantify the portion of the measured $PM_{2.5}$ concentrations which is attributable to the nearby source at each violating monitor. Results show the adjacent local source causing exceedances in situations with moderate and even relatively low (less than 10 μg/m^3) regional concentrations.

2. Methods

The regulatory version of AERMOD (version 07026) was used to complete the local source contribution analyses. In Scott County the emissions from Blackhawk Foundry were modeled and the resultant $PM_{2.5}$ concentrations predicted near the adjacent violating monitor site reviewed. The same techniques were used to calculate the impacts from GPC[1] near the violating monitor in Muscatine County. AERMOD is an Appendix W regulatory model approved for use in construction permitting and PSD projects where $PM_{2.5}$ emissions are of concern. Although AERMOD is a steady-state plume model designed to error conservatively in the parameterization of atmospheric conditions, the methods described below are well suited to address one of EPA's concerns by assessing the portion of $PM_{2.5}$ attributable to the local source.

i. Blackhawk Foundry

Separate AERMOD simulations were run for each year used in the current design value calculation - 2005, 2006, and 2007. For each year, individual simulations were run for each of the three monitor locations in Davenport (Blackhawk, Jefferson, and Adams) using meteorological data from the Quad Cities Airport that was processed and quality assured for use in AERMOD. Each analysis included a 60-degree arc of receptors centered on the monitor. The arc was created in such a way that each receptor would be equidistant from the Cupola stack at Blackhawk Foundry. AERMOD was executed for each of the nine analyses and the average 24-hour value for every day at each receptor was output. Results are based upon the best available $PM_{2.5}$ emission rate estimates for emissions sources at the foundry.

ii. Grain Processing Corporation

Separate AERMOD simulations were run for each year used in the current design value calculation that contained at least one exceedance of the 24-hour $PM_{2.5}$ NAAQS - 2005 and 2007. For each year, simulations were run for the monitor located in Muscatine (Garfield) using meteorological data from the Cedar Rapids Airport that was processed and quality assured for use in AERMOD. Each analysis included a 60-degree arc of receptors centered on the monitor. Due to the size of GPC/MPW facility complex, and the uncertainty of the source(s) that most significantly affect the monitored concentrations, the orientation of the arc was determined based on the predominant wind directions observed during the majority of the exceedance days. As such, the arc was created in such a way that each receptor would be equidistant from a point due East of the monitor and centered in the middle of the GPC sources in that area of the facility. AERMOD was executed for both of the analyses and the average 24-hour value for every day at each receptor was output. Results are based upon the best available $PM_{2.5}$ emission rate estimates for emissions sources at GPC and MPW, but it should be noted that no fugitive emissions were included in the analysis as that data is currently not available.

[1] Due to the proximity of Muscatine Power and Water (MPW) to GPC, the facilities were modeled congruently within AERMOD. The model concentrations predicted by AERMOD show contributions from MPW are insignificant.

3. Results for Scott County: Blackhawk Foundry

The average 24-hour values for each day are provided in Table 1. The results generally show a good correlation between modeled and observed concentrations, with most days yielding agreement within 10% of observed concentrations. On average, the analysis shows that when a local source signal is present, Blackhawk Foundry is contributing between 1/5th and 1/4th (22.3%) of the total $PM_{2.5}$ concentration. Modeled 24-hour impacts attributable to Blackhawk Foundry on these days average 8.9 μg/m^3 and extend up to 13.8 μg/m^3. Over all days, the maximum impact predicted by AERMOD along the arc was over 20.0 μg/m^3, which approximates the estimated 17 μg/m^3 impact from Blackhawk Foundry monitored on 9/13/2005.

The exceedance days analyzed correspond to events where 24-hour concentrations at the Blackhawk Foundry monitor were at least 2 μg/m^3 higher than nearby monitors. This parameter focuses the analysis on days with clear local source impacts. Twelve of the 17 total exceedance days at the Blackhawk Foundry monitor meet these conditions. For each of these exceedance days, the maximum predicted concentration caused by Blackhawk at any receptor on the Adams and Jefferson monitor receptor arcs was determined. This maximum was assumed to be Blackhawk's contribution to the observed concentrations at each monitor on the exceedance days. Blackhawk's predicted concentrations at the Adams and Jefferson monitors were subtracted from the observed concentrations at each monitor to obtain the net background value at each location.[2] The two net background values were averaged to determine the equivalent background concentration for each exceedance day. The maximum predicted concentration from Blackhawk on the Blackhawk receptor arc was then added to the background value to determine the total predicted concentration for each exceedance day. The predicted concentration was compared to the observed concentration, and both the magnitude and percentage differences between the two were calculated.

The local source contributions attributable to Blackhawk Foundry on most exceedance days was significant, over 20%. The results confirm Blackhawk's role in causing or contributing to exceedances. With the vast majority of the remaining $PM_{2.5}$ attributable to sources outside Scott and Rock Island Counties, as discussed in the following Section C, the appropriate nonattainment boundary is a small region around the foundry.

4. Results for Muscatine County: Grain Processing Corporation

The average 24-hour values for each day are provided in Table 2. The results show a bias towards underestimates in the vicinity of the monitor, with a large portion of the days yielding concentrations around 30% to 40% less than the observed concentrations. But even with the underestimate bias the analysis shows that when a local source signal is present, GPC/MPW are contributing approximately 1/3rd (32.0 %) of the total $PM_{2.5}$ concentration. Modeled 24-hour averaged impacts attributable to GPC/MPW on these days average 11.3 μg/m^3 and extend up to 23.7 μg/m^3.

It appears that the cause of the underestimation bias is the lack of fugitive emissions in the model. To test this theory the only other variable that could significantly affect the model results – the

[2] There was one day in which observed concentrations from neither Jefferson nor Adams monitors were available. In this case the observed concentration from the Garfield monitor in Muscatine was used as the background value for the day.

meteorological data – was analyzed. Meteorological data from the Muscatine airport, located approximately 6 miles to the southwest of the facility, was obtained. Large portions of the data were either incomplete or questionable, so only the exceedance days were processed for use in AERMOD. When the Muscatine meteorological data were input into the model, AERMOD predicted results that were very similar to those obtained when using the Cedar Rapids data. Based on the similarity of the results of each analysis it seems reasonable to conclude that the underestimation provided by the model is due to the lack of fugitive emissions from GPC and MPW.

Even with the underestimation bias, the local source contributions attributable to GPC and MPW on more than half of the exceedance days was significant, over 20%, with an average contribution for all exceedance days of 32%. The results strongly suggest GPC and MPW's role in causing or contributing to exceedances.

The exceedance days analyzed correspond to events where 24-hour averaged concentrations at the Garfield Monitor exceeded the 24-hour $PM_{2.5}$ NAAQS. Due to the distance between GPC/MPW and the regional monitors in the area, both facilities were assumed to have zero impact at the monitors. The background value for each exceedance day was determined by calculating the average of the observed values at the Adams and Jefferson monitors located in Davenport. The maximum predicted concentration from GPC and MPW on the Garfield receptor arc was then added to the background value to determine the total predicted concentration for each exceedance day. The predicted concentration was compared to the observed concentration, and both the magnitude and percentage differences between the two were calculated.

5. Illinois EPA Rock Island County Dispersion Modeling Analysis

The IL EPA has completed an AERMOD dispersion modeling analysis to assess the impacts of direct $PM_{2.5}$ emissions from point sources in Rock Island County on $PM_{2.5}$ concentrations at the Blackhawk Foundry monitor. Results from their analysis show direct $PM_{2.5}$ emissions from Rock Island point sources contribute at most 1.17 $\mu g/m^3$ to 24-hour $PM_{2.5}$ concentrations.[3] EPA has not yet promulgated a significant impact threshold for 24-hour $PM_{2.5}$, but EPA has proposed a range of 24-hour significant impact levels (SIL) for PSD purposes (FR 54115, September 21, 2007). The proposed SILs for Class II areas range from 1.2 to 5.0 ug/m3, which would be used under the PSD program to define the significance of impact for a single source. Based on the proposed SILs, the maximum impact of all Rock Island County sources combined, 1.17 ug/m3, is insignificant. The results support the exclusion of Rock Island County from a nonattainment designation. Additional discussion of these methods and results is included in IL EPA's response document.

[3] The reported value represents the maximum concentration modeled over the 2003 -2007 five year period.

Table 1. Quantification of Blackhawk Foundry's contribution to total monitored $PM_{2.5}$ concentrations on exceedance days at the Blackhawk Foundry monitor. Predicted concentrations calculated using AERMOD.

	Monitored Concentrations			Blackhawk's Predicted Concentration at Monitor Locations			Net Background Concentrations		Equivalent Average Background	Total Predicted Concentration	Difference Between Modeled and Observed Concentrations		Attributable to Blackhawk Foundry
Date	**Blackhawk**	**Jefferson**	**Adams**	**Blackhawk**	**Jefferson**	**Adams**	**Jefferson**	**Adams**			**Magnitude**	**Percentage**	**Percentage**
2/3/2005	40.0	37.0	34.9	4.0	1.9	0.1	35.1	34.8	35.0	39.0	-1.0	-3%	10%
6/24/2005	36.8	30.5	31.4	13.8	1.8	1.3	28.7	30.1	29.4	43.2	6.4	17%	32%
6/27/2005	41.7	37.6	37.5	10.5	0.5	0.7	37.1	36.8	37.0	47.5	5.8	14%	22%
8/2/2005	50.5	44.0	44.5	10.9	0.1	1.2	43.9	43.3	43.6	54.5	4.0	8%	20%
9/13/2005	41.2	24.2		9.3	2.1	1.1	22.1		22.1	31.4	-9.8	-24%	30%
11/25/2006	36.2	38.0	35.4	10.7	1.8	1.0	36.2	34.4	35.3	46.0	9.8	27%	23%
6/16/2007	35.6			4.1	0.1	0.0			32.0	36.1	0.5	1%	11%
7/26/2007	36.0	28.1	30.3	10.0	1.3	0.6	26.8	29.7	28.3	38.2	2.2	6%	26%
9/21/2007	37.4	23.9	24.2	12.8	1.8	1.1	22.1	23.1	22.6	35.3	-2.1	-6%	36%
11/19/2007	39.1	27.4		6.4	0.9	0.6	26.5		26.5	33.0	-6.1	-16%	20%
11/20/2007	38.3	35.8	34.3	3.7	0.4	0.4	35.4	33.9	34.7	38.3	0.0	0%	10%
12/17/2007	38.2	28.5	31.9	10.8	1.6	1.1	26.9	30.8	28.8	39.6	1.4	4%	27%

Table 2. Quantification of GPC's and MPW's contribution to total monitored $PM_{2.5}$ concentrations on exceedance days at the Garfield monitor. Predicted concentrations calculated using AERMOD.

Monitored Concentrations				GPC and MPW's Predicted Concentration	Background	Total Predicted Concentration	Difference Between Modeled and Observed Concentrations		Attributable to GPC/MPW
Date	Garfield	Jefferson	Adams	Garfield			Magnitude	Percentage	Percentage
1/31/2005	37	31	31	14.5	30.8	45.3	8.7	24%	32%
2/3/2005	36	37	35	0.0	36.0	36.0	0.3	1%	0%
6/27/2005	37	38	38	1.7	37.6	39.2	1.9	5%	4%
8/2/2005	44	44	45	2.2	44.3	46.4	2.8	6%	5%
12/21/2005	37	31	11	6.4	21.3	27.7	-9.1	-25%	23%
2/23/2007	44	10	9	14.7	9.3	24.0	-20.0	-45%	61%
2/24/2007	53	9	9	10.8	9.1	19.8	-33.4	-63%	54%
2/28/2007	55	19		14.7	19.1	33.8	-20.9	-38%	44%
3/9/2007	42	42		2.0	42.1	44.1	2.6	6%	5%
5/3/2007	42	9	8	16.1	8.6	24.7	-17.5	-41%	65%
5/4/2007	61	15		23.7	15.0	38.7	-22.3	-37%	61%
5/5/2007	63	23		18.7	23.3	42.0	-21.2	-34%	44%
12/19/2007	55	57		13.7	57.2	70.9	16.0	29%	19%
12/20/2007	48	45	46	18.8	45.7	64.4	16.8	35%	29%

C. Contribution Assessments Beyond Local Scale

1. Summary

Sources in Rock Island County, rural Scott County, and rural Muscatine County are not causing or contributing to the NAAQS violations at either the Blackhawk Foundry or Garfield School monitors. The technical evidence supports defining a nonattainment boundary focused upon the sources near the violating monitors.

Photochemical modeling simulations completed by the IDNR, IL EPA, and EPA Region 7 show contributions to particulate matter at the Blackhawk Foundry monitor from Rock Island County sources are negligible, at approximately 1 to 2%. Commuting patterns between Scott and Rock Island Counties have insignificant impacts upon the $PM_{2.5}$ concentrations as well, with mobile sources in the Quad Cities contributing less than a 1% average impact on modeled $PM_{2.5}$ concentrations. Rock Island sources are not contributing to the NAAQS violation in Scott County and should not be included in any nonattainment area.

The appropriate nonattainment boundaries in both Scott and Muscatine Counties are justifiably confined to a sub-county area in the vicinity of the violating monitor. Photochemical modeling completed by IDNR and EPA Region 7 reveal anthropogenic fine particulate, NOx, and SO_2 sources in rural Scott County and rural Muscatine County have approximately a 1% impact on $PM_{2.5}$ concentrations predicted at the grid cells containing the violating monitors. Longer range transport is predominantly responsible for the overwhelming majority (~97%) of the modeled $PM_{2.5}$ concentrations at the violating monitors.

2. Overview

The importance of nearby sources in contributing to monitored exceedances was quantified using AERMOD. Photochemical grid modeling is an EPA accepted method suited to addressing the role of metro and regional sources, and the importance of precursor SO_2 and NOx emissions on $PM_{2.5}$ concentrations in Rock Island, Scott, and Muscatine Counties. The models currently available, such as CMAQ and CAMx, are capable of providing meaningful data regarding the impacts of longer range transport, the importance of precursor gases, and the role of sources in the area. These models are not yet capable of reliably assessing the impacts of a single source at the source-receptor distances encountered in Muscatine and Scott Counties (approximately 150 – 500 meters). EPA has not identified or approved for use a single tool which can accurately integrate and simulate all pertinent processes impacting $PM_{2.5}$ formation across the scales of interest, from local to continental.

The photochemical grid modeling analyses were structured and designed to provide useful information in a timely manner. A modeling concept whitepaper was developed by IDNR, with assistance from IL EPA, and agreed upon by EPA Region 7. The plan provides an overview of the methods and sensitivity runs designed to assess metro, county, and longer range contributions. The document is provided in Appendix K.

The IDNR utilized the Lake Michigan Air Directors Consortium (LADCO) 2005 BaseM (Round3) dataset to establish the modeled basecase. The LADCO data provide SIP quality meteorology, emissions, and photochemical model inputs and represents the only reliable basecase dataset available which corresponds to a year in the 2005-2007 timeframe. A conservative review of model performance is provided in Appendix L.

To refine the analysis and reduce run times, the IDNR created a 12 km modeling domain from a subset of the LADCO 12 km domain. The IDNR 12 km domain is pictured in Figure 6 in relation to the LADCO 36 km '4rpos' domain. Emissions data for the IDNR 12 km domain were extracted directly from the LADCO 12 km data. Meteorological data were flexi-nested from the 36 km domain. Flexi-nesting the meteorology was necessary to complete the project on time and is not expected to compromise results given the relatively simple topography found within the 12 km domain.

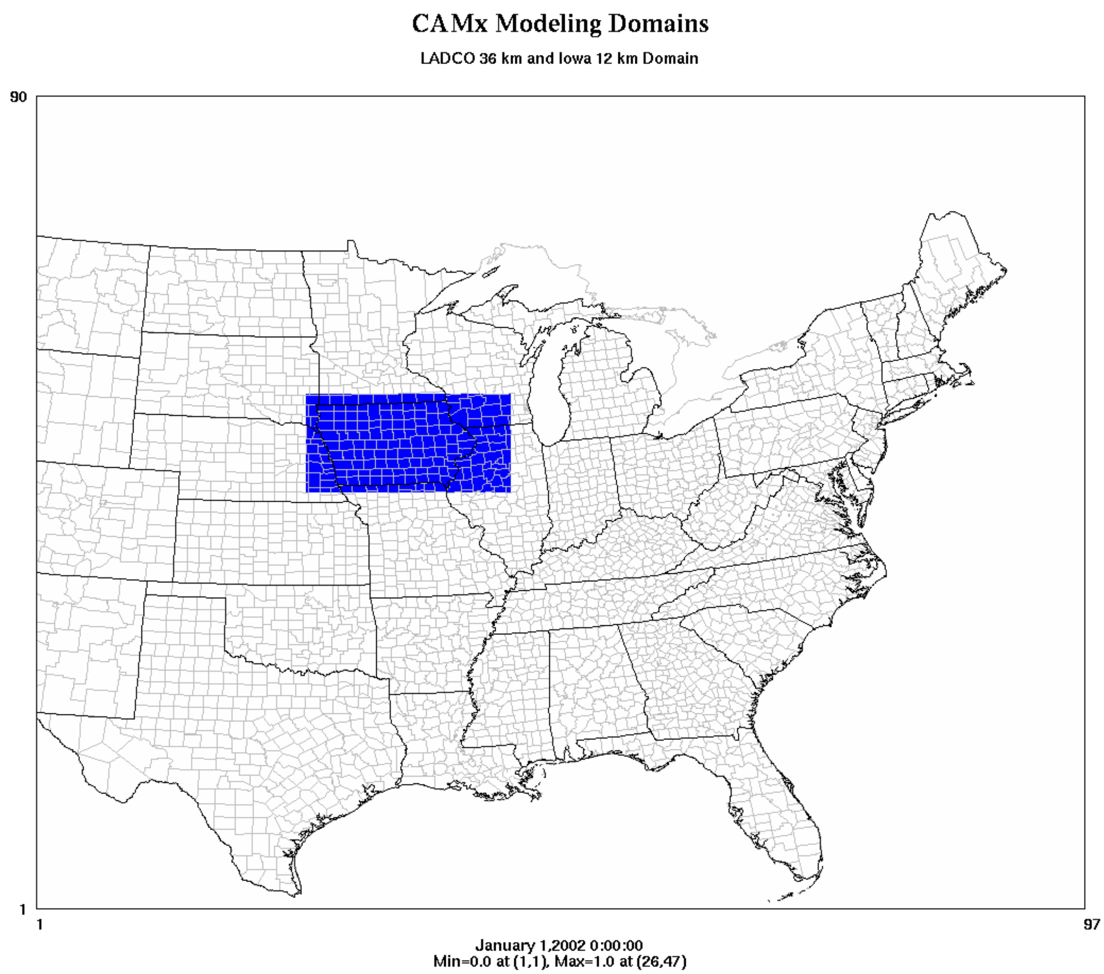

Figure 6. Spatial configuration of CAMx using the 36 km LADCO 4rpo domain and the IDNR 12 km domain.

3. Apportionment Sensitivity Analyses

A zero-out sensitivity modeling approach was utilized by the IDNR to investigate the impacts attributable to specific counties and areas. A zero-out analysis involves eliminating fine particulate and precursor gas emissions in areas of interest and comparing the resulting modeled concentrations at given locations to a basecase simulation. Three rounds of zero-out modeling runs were conducted to support IDNR's response to EPA's proposed nonattainment boundary in Scott and Rock Island Counties and one run conducted to support IDNR's response to EPA's proposed nonattainment boundary for Muscatine County. Each round of modeling contains a unique set of emission types and source locations which are zeroed out. The sensitivity simulations are briefly described in Table 3.

Table 3. Description of the zero-out modeling sensitivity runs.

Round	Area	Source Sectors	Pollutants
Rock Island	Rock Island County	All Anthropogenic	NO_x,SO_2,Fine Primary
Scott County 1	Rural Scott County	All Anthropogenic	NO_x,SO_2,Fine Primary
Scott County 2	Quad Cities Metro	Onroad	All
Muscatine County	Rural Muscatine County	All Anthropogenic	NO_x,SO_2,Fine Primary

4. Contributions from Sources in Rock Island County

i. Evaluation shows that Rock Island County Should be Excluded from Nonattainment Area.

The results of this analysis provide a quantitative justification for the exclusion of Rock Island County from the nonattainment area. On days in which either an exceedance in Scott County was monitored, or the model predicted an exceedance, the maximum nitrate ion reduction was only approximately 0.04 $\mu g/m^3$. Assessing the sulfate contribution, eliminating anthropogenic sources in Rock Island on these days leads to an average reduction of 0.16 $\mu g/m^3$ with the corresponding maximum reduction remaining well below 1 $\mu g/m^3$, at 0.66 $\mu g/m^3$. In all these monitored or modeled exceedance cases, more than 95% of the total $PM_{2.5}$ concentration at the Blackhawk Foundry grid cell originates with sources outside of Rock Island County.

In proposing Rock Island County as part of the Scott County nonattainment area, EPA has stated "Rock Island County has emissions that commonly are transported toward the violating monitor in Scott County." The impacts of the Rock Island sources are minimal as indicated from the CAMx model sensitivity results and IL EPA AERMOD results discussed above, and should not be included in the nonattainment area.

The fact that Rock Island and Scott Counties are in the same CBSA should not be used to influence the decision to designate Rock Island as nonattainment. The June 8th, 2007, "Area Designations for the Revised 24-Hour Fine Particulate National Ambient Air Quality Standards" guidance issued by EPA explicitly removed any presumptive boundaries based upon CBSA for areas only violating the 24-hour $PM_{2.5}$ standard. The presence of a broad mix of sources in Rock Island County sheds no light upon their potential contributions as it does not address pollutant types, emission rates, chemical transformation, or quantification of impacts.

ii. Methods and Results

The zero-out sensitivity analysis focuses upon the emissions in Rock Island County, IL, their impacts on Scott County, IA, and specifically the grid cell in which the Blackhawk Foundry monitor is located. All elevated point source emissions of primary fine particulate matter, sulfate, and nitrates in Rock Island County were zeroed. The same pollutant emissions were zeroed for all other anthropogenic emissions (e.g. area, onroad, offroad, marine-aircraft-locomotive, and low-point sources) in the 12 km grid cells over Rock Island County. Emissions of VOCs and NH_3 were not altered as they are not presumptively regulated $PM_{2.5}$ precursor pollutants, and EPA specifically identified the need to further analyze SO_2 and NOx precursor emissions. Fine primary particulate emissions were zeroed as they are regulated in the new source review and fine particle implementation rules.

The differences in $PM_{2.5}$ concentrations between the basecase and zero-out sensitivity analysis (prioritizing results in Scott County at the grid cell containing the Blackhawk Foundry monitor) were identified and quantified. During the analysis of results, a discrepancy was found between the methods used to generate the basecase and the sensitivity run point source emissions inputs. The inconsistency involves the exclusion of the Canadian point source inventory from the sensitivity run.[4] As the omission impacts only the IDNR sensitivity runs, a robust evaluation of Rock Island County's impacts can still be completed using the results of the IL EPA simulation. The datasets and methods used by the IL EPA are otherwise essentially identical to the procedures utilized by the IDNR.[5] All results discussing the impacts of the Rock Island County sources utilize the data generated by IL EPA and are thus not impacted by the discrepancy.

$PM_{2.5}$ concentrations from the basecase and the IL EPA Rock Island zero-out runs are very similar across the entire modeled year (Figure 7). Eliminating the anthropogenic particulate, SO_2, and NOx emissions in Rock Island County, IL, yields an annual average reduction in total $PM_{2.5}$ concentrations at the violating monitor in Scott County of only 4% relative to the basecase. Examining those days in which observed exceedances occurred anywhere in Scott County Iowa (see Table 4) the average reduction decreases to only 2% of the modeled basecase concentrations. When 24-hour modeled basecase $PM_{2.5}$ concentrations were greater than or equal to 35.5 $\mu g/m^3$, eliminating all emissions in Rock Island County reduces total $PM_{2.5}$ concentrations on average by 2% and on these same days the maximum reduction in modeled 24-hour average concentrations at the Blackhawk Foundry grid cell is 5%, as seen in Figure 8.

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[4] Details of this issue will be discussed in the following subsection.

[5] Using the LADCO 12 km grid the IL EPA zeroed out all point source NOx, SO_2, and fine primary particulate matter from all anthropogenic sources in Rock Island County, only slight differences in processing methodology occurred, the impacts of which are negligible.

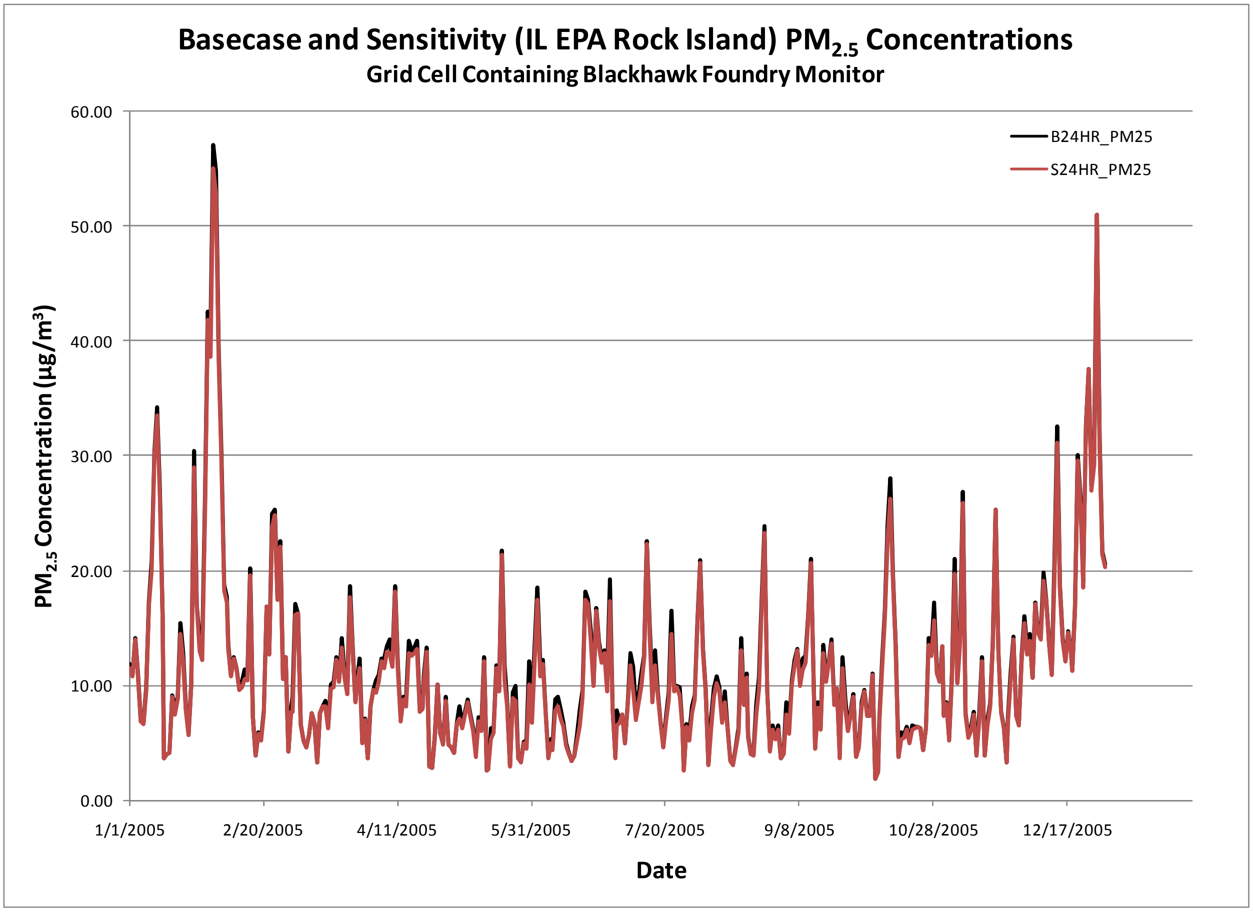

Figure 7. $PM_{2.5}$ concentrations for the basecase and Rock Island County sensitivity runs at the grid cell containing the Blackhawk Foundry monitor.

Table 4. Dates on which an exceedance occurred in 2005 at any monitor in Scott County, IA.

2005 Exceedance Dates		
1/30	6/27	9/12
2/1	8/2	9/13
2/3	9/10	12/14
6/24	9/11	

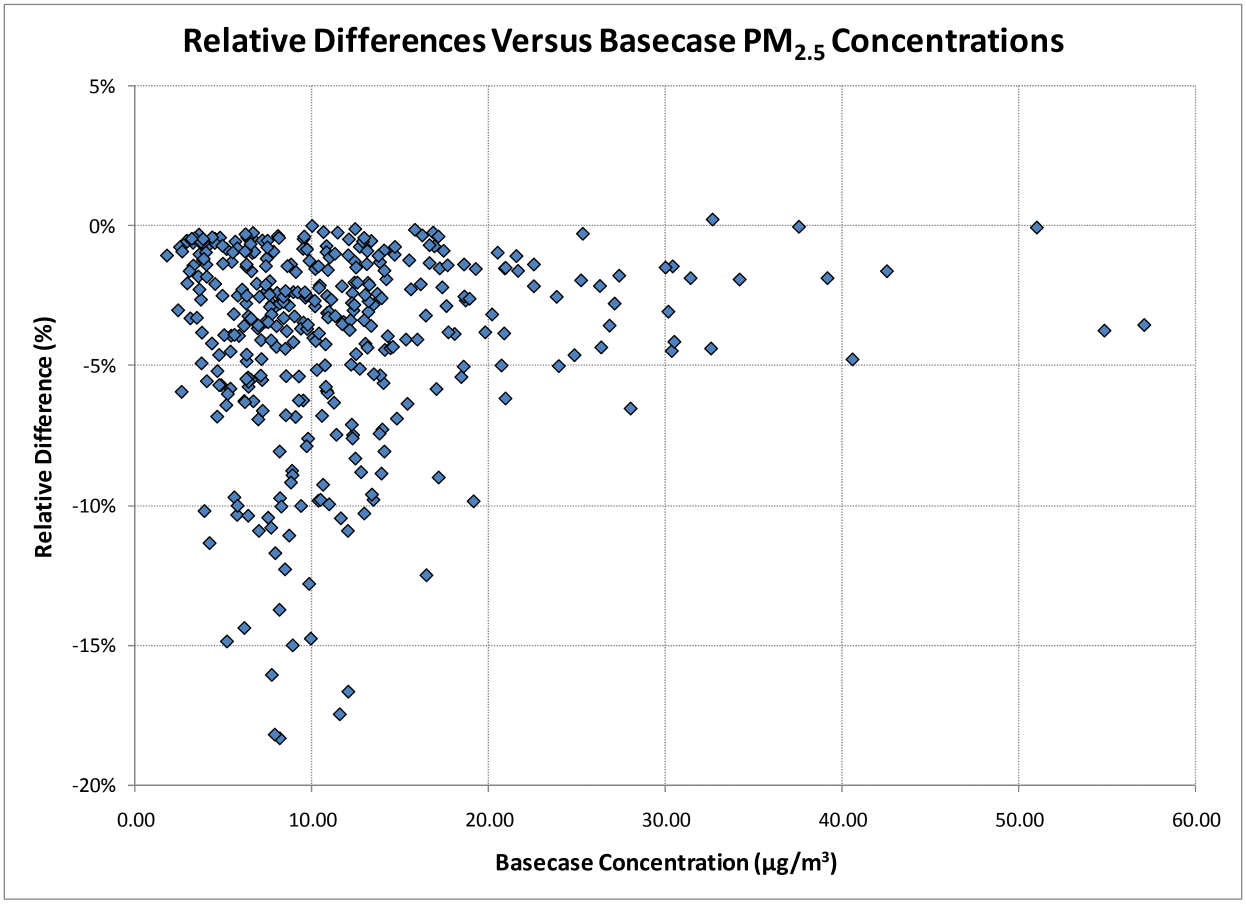

Figure 8. Relative differences in basecase and Rock Island County zero-out $PM_{2.5}$ concentrations as a function of basecase concentrations at the grid cell containing the Blackhawk Foundry monitor.

Examining the impacts of the simulation upon nitrate and sulfate ion concentrations, the largest nitrate ion reduction modeled in the annual simulation is 0.46 $\mu g/m^3$, while the largest sulfate ion reduction modeled is 0.8 $\mu g/m^3$. These maxima do not happen concurrently in time. In fact, the largest particulate sulfate reductions are often partially negated by increases in ammonium nitrate concentrations. When changes in the sulfate and nitrate particulate ion concentrations on the modeled or observed exceedance days are summed, a greater number of days actually yield increases. The maximum reduction modeled was only 0.15 $\mu g/m^3$. The negligible impacts attributable to Rock Island support excluding the county from a nonattainment area.

5. Sensitivity Caveat

As mentioned previously, a discrepancy was identified between the basecase and sensitivity point source emissions processing methods used by the IDNR. The basecase simulation contained a single elevated point source file. This file was generated by LADCO from the combination of three independent elevated point source files: emissions from electrical generating units (EGUs), non-EGU point source emissions, and all Canadian point source emissions.[6] When building the point source emissions files for the sensitivity runs, the Canadian point source inventory was unavailable. The omission could not be corrected in time to meet the October 20th, response deadline. It is important to

[6] The EGU and non-EGU point source files only contain emissions in the U.S.

note that only the IDNR sensitivity analyses in which elevated point source emissions are zeroed are impacted by this issue. The IDNR sensitivity run zeroing mobile source emissions in the Quad Cities is not affected. The IL EPA Rock Island sensitivity run and the CAMx source apportionment run conducted by EPA Region 7 were completed independently and are thus not affected by this issue.

A brief comparison of the IL EPA and IDNR data for the Rock Island zero out runs revealed that the impacts of omitting the Canadian point source inventory were generally small and results from the sensitivity simulations were in agreement . Approximately 97.5% of all days yielded differences between the sensitivities under 1 $\mu g/m^3$. The largest differences predominantly occurred when total $PM_{2.5}$ concentrations were well below the level of the 24-hour $PM_{2.5}$ NAAQS. Nonetheless, the rural Scott County and rural Muscatine County sensitivity runs discussed below contain a caveat. The results show not just the impacts of the rural county reductions in question, but the impacts of the rural county reductions while simultaneously eliminating all elevated point source emissions in Canada. Since this issue has a generally small influence on concentrations, predominantly impacts relatively clean days, and yields results which primarily error conservatively (artificially increasing the impacts attributable to those sources zeroed out in the sensitivity run) the results of the IDNR sensitivity analyses are still valid.

6. Contributions from Sources in Rural Scott County

i. Rural Scott County Sources do Not Play a Role in Violations

In predictive modeling the elimination of all emissions in Scott County outside the metro area reduces total $PM_{2.5}$ concentrations on average by 3%. Conversely, nearly 97% of the $PM_{2.5}$ originates from sources outside rural Scott County.

ii. Methods and Results

To support a sub-county nonattainment boundary in Scott County, an assessment of the sources outside the Quad Cities metro area were examined. In this sensitivity analysis all gridded, anthropogenic SO_2, NOx, and primary fine particulate emissions in the grid cells outside the metro area in Scott County were zeroed.[7] These pollutant emissions from elevated point sources outside the city limits, shown in Table 5, were also zeroed. The modeled basecase and zero-out simulations are shown in Figure 9, and the frequency distribution of differences between basecase and zero-out $PM_{2.5}$ concentrations relative to the basecase concentrations are shown in Figure 10 , with a negative relative difference indicating a reduction in $PM_{2.5}$. While the data in Figure 10 can be used to calculate that 20% of the modeled concentrations are reduced by more than 10%, Figure 11 shows that these large reductions only occur when modeled basecase concentrations are less than 20 $\mu g/m^3$. When 24-hour modeled $PM_{2.5}$ concentrations were greater than or equal to 35.5 $\mu g/m^3$, eliminating all emissions in Scott County outside the metro area reduces total $PM_{2.5}$ concentrations on average by 3%. Conversely, nearly 97% of the $PM_{2.5}$ originates from sources outside rural Scott County. On the monitored exceedance days, a reduction in the $PM_{2.5}$ concentrations of approximately only 1% occurs with this analysis. This value includes three monitored exceedance days where the zero-out run actually produced higher 24-hour $PM_{2.5}$ concentrations at the grid cell containing the Blackhawk Foundry monitor. Sources in rural Scott County are not causing or contributing to exceedances.

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[7] As mentioned previously, a discrepancy was identified between the basecase and sensitivity emissions which modifies sensitivity run design, but does not alter conclusions.

Table 5. Elevated point sources zeroed-out for the rural Scott County sensitivity analysis.

Facility Name	Facility ID	Latitude	Longitude
Linwood Mining & Mineral Corp.	82-01-015	41.46°	-90.68°
John Deere – Davenport Works	82-01-043	41.59°	-90.56°
Scott Area Sanitary Landfill	82-01-121	41.47°	-90.68°
Lafarge North America, Inc.	82-04-005	41.46°	-90.69°

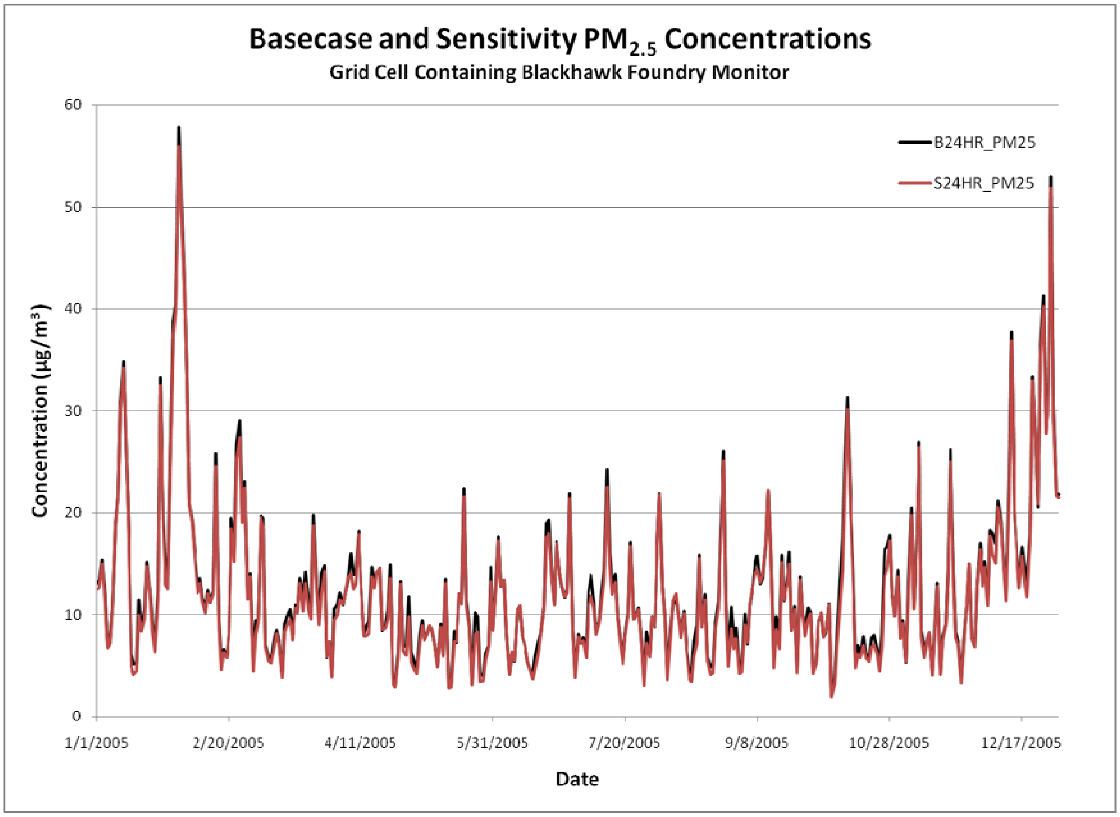

Figure 9. $PM_{2.5}$ concentrations for the basecase and rural Scott County sensitivity runs at the grid cell containing the Blackhawk Foundry monitor.

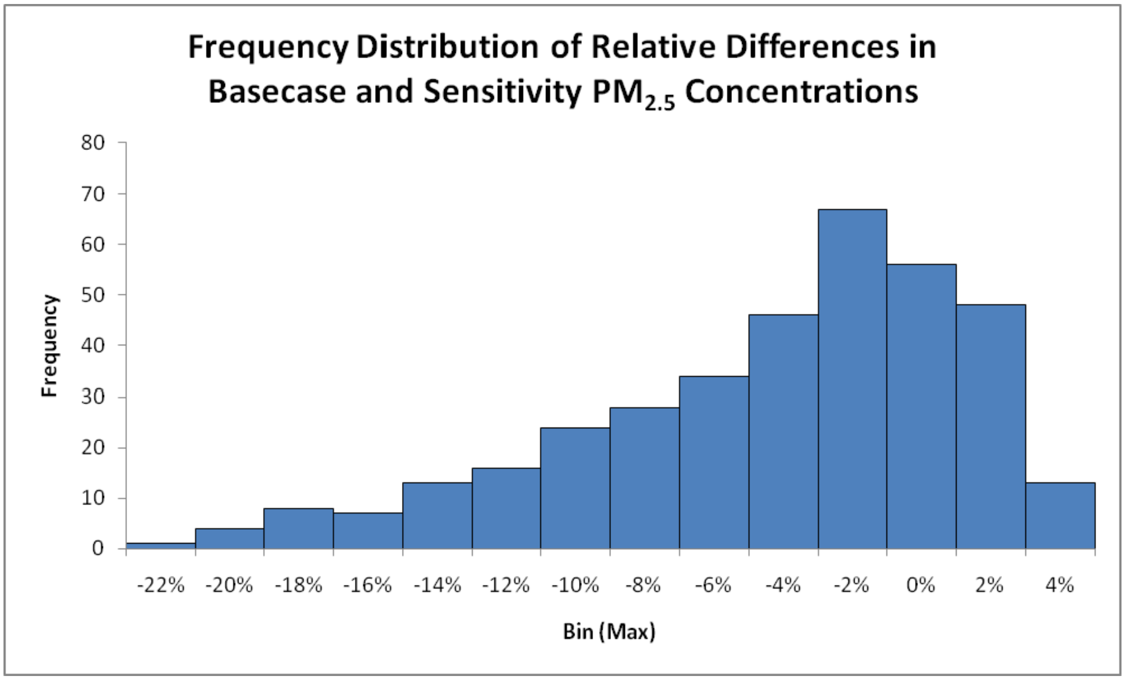

Figure 10. Histogram of relative differences in basecase and zero-out $PM_{2.5}$ concentrations at the grid cell containing the Blackhawk Foundry monitor.

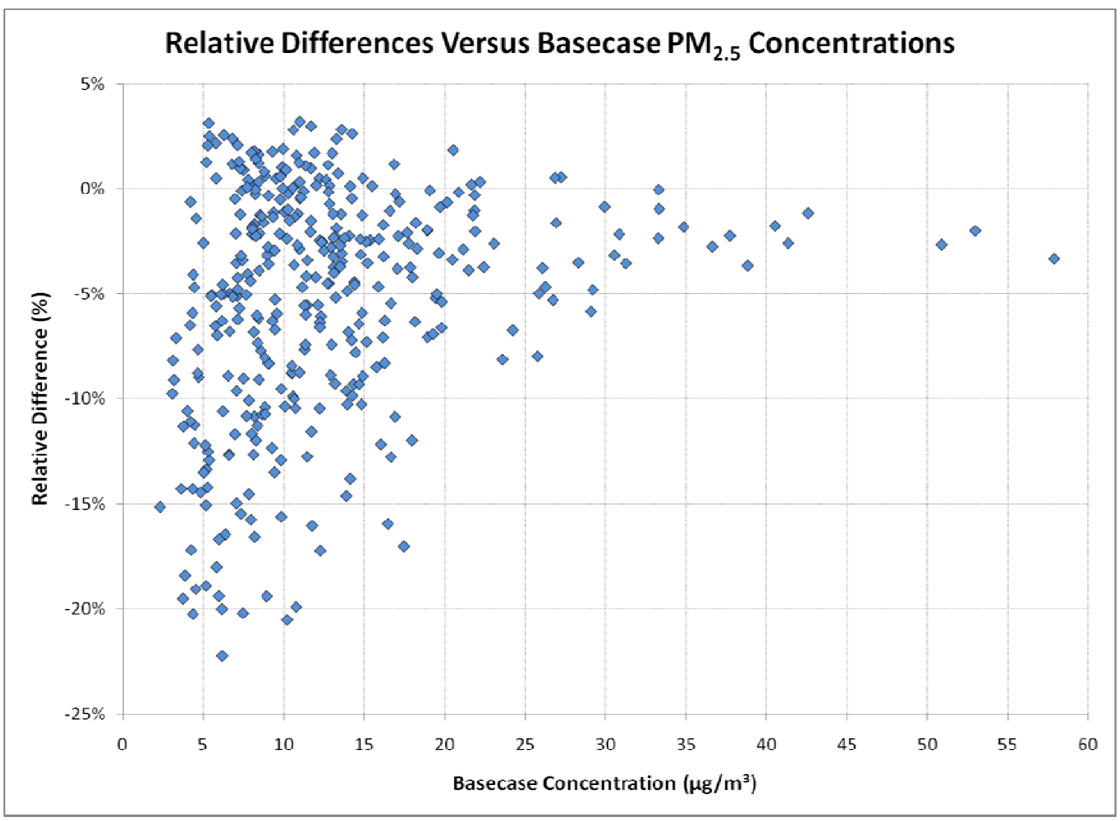

Figure 11. Relative differences in basecase and zero-out $PM_{2.5}$ concentrations as a function of basecase concentrations at the grid cell containing the Blackhawk Foundry monitor.

7. Contributions from Mobile Sources in the Quad Cities

i. Violations cannot be attributed to mobile sources.

Approximately 13,000 commuters travel from Rock Island to Scott County, and vice-versa. EPA has stated "A county with numerous commuters is generally an integral part of an urban area and is likely contributing to fine particle concentrations in the area." Additional analysis suggests that emissions from these commuters do not contribute to monitored concentrations during exceedance events.

ii. Methods and Results

A sensitivity analysis examining the impacts of mobile sources in the Quad Cities yields a quantitative measure of their contribution to local $PM_{2.5}$ concentrations. The design of the sensitivity analysis removes all on-road mobile source emissions in the Quad Cities. To increase the stringency of the contribution assessment, all mobile source pollutants (not just SO_2, NOx, and primary particulate) were assigned an emission rate of zero. A unique feature of the simulation is thus the elimination of VOC emissions. This sensitivity analysis shows that eliminating onroad emissions within the Quad Cities metro results in an average reduction in $PM_{2.5}$ concentration at the grid cell containing the Blackhawk Foundry monitor of only 1%. A time series of differences in concentration relative to the basecase (Figure 12) shows reductions are most often between 1% and 3%, and are greater than 5% only once during the entire modeled year. This 5% reduction occurs during a day in which modeled and observed 24-hour averaged $PM_{2.5}$ concentrations were under 10 $\mu g/m^3$. Therefore, mobile source emissions in the Quad Cities metropolitan area cannot be attributed to the nonattainment problem at the Blackhawk Foundry monitor.

iii. Other Considerations

It should also be noted that traffic rates decrease as the exceeding monitor in Scott County is approached (Figure 13). This is a further indication that commuting information should not be given weight to justify Rock Island's inclusion in the nonattainment area.

In the case of Washington State's proposal, over 18,500 commuters were traveling to work from King County (proposed attainment) to the adjacent proposed partial nonattainment county of Pierce County. The counter flow exceeded 80,700 commuters. From this example, clearly traffic patterns and 'integral' areas alone are not a sufficient justification for inclusion of an adjacent county.

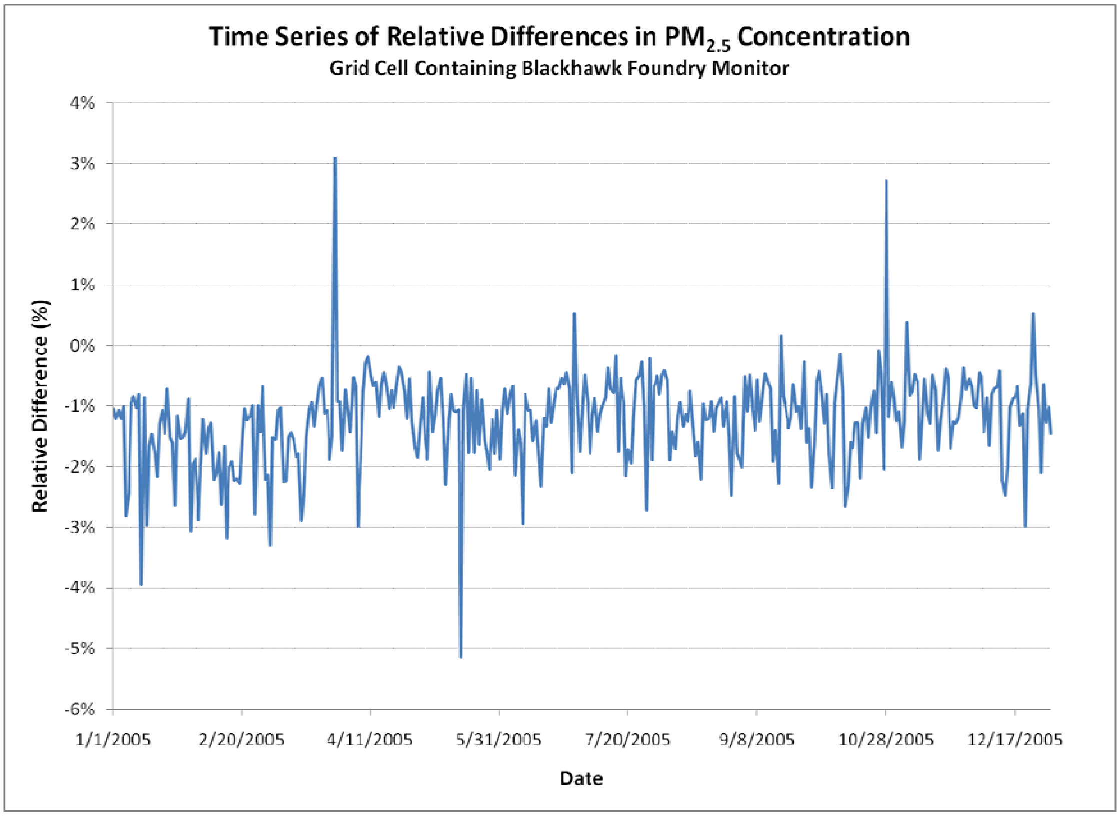

Figure 12. Time series of differences in $PM_{2.5}$ concentrations relative to the basecase at the grid cell containing the Blackhawk Foundry monitor.

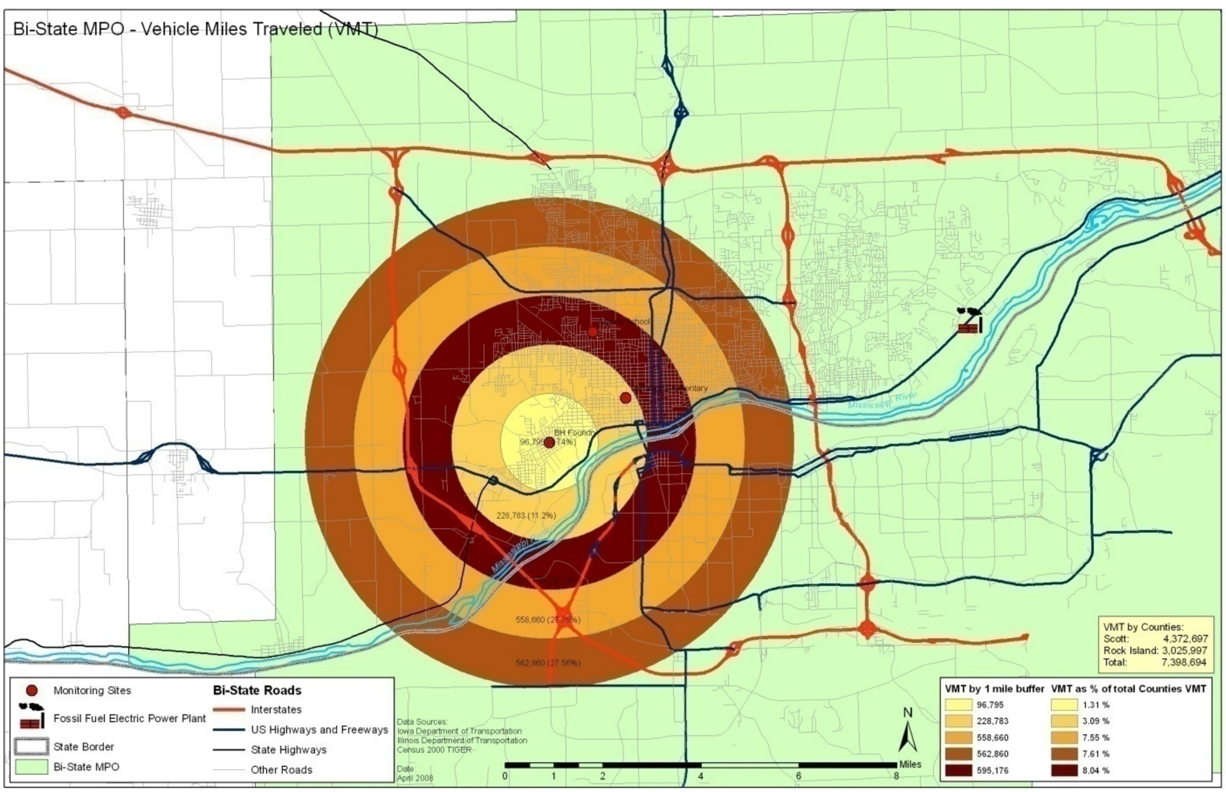

Figure 13. Vehicle miles traveled in 1 mile buffers centered on the Blackhawk Foundry monitor. Values decrease as the monitor is approached.

8. Contributions from Sources in Rural Muscatine County

i. Violations cannot be attributed to sources in rural Muscatine County

The sensitivity modeling results indicate that direct $PM_{2.5}$ emissions and emissions of precursor gases from sources located in rural Muscatine County do not cause or significantly influence concentrations in the City of Muscatine.

ii. Methods and Results

To support a sub-county Muscatine nonattainment boundary, an assessment of the sources outside of the city of Muscatine area were examined. In this sensitivity analysis all gridded, anthropogenic SO_2, NOx, and primary fine particulate emissions in the grid cells outside the city of Muscatine were zeroed.[8] These pollutant emissions from elevated point sources outside the city limits, shown in Table 6, were also zeroed. Figure 14 shows little difference between the basecase and zero-out $PM_{2.5}$ concentrations at the grid cell containing the Garfield Elementary monitor, with an average reduction of 3% relative to the basecase concentration. A reduction in the $PM_{2.5}$ concentrations of approximately 1% occurs on the monitored exceedance days with this analysis. When 24-hour modeled $PM_{2.5}$ concentrations were greater than or equal to 35.5 $\mu g/m^3$, eliminating all emissions in Muscatine County outside the city of Muscatine reduces total $PM_{2.5}$ concentrations on average by 2%, with the largest reduction being 3%. Sources in rural Scott Muscatine County are not causing or contributing to exceedances.

Table 6. Elevated point sources zeroed-out for the rural Muscatine County sensitivity analysis.

Facility Name	Facility ID	Latitude	Longitude
Natural Gas Pipeline Co. of America	58-04-002	41.38°	-91.19°
Monsanto Company	70-01-008	41.35°	-91.08°
Allsteel Muscatine Components Plant	70-01-050	41.36°	-91.14°
North Star Steel Company	70-03-003	41.59°	-91.03°
IPSCO Steel, Inc.	70-08-002	41.48°	-90.82°
Central Iowa Power Cooperative	70-08-003	41.45°	-90.82°

[8] As mentioned previously, a discrepancy was identified between the basecase and sensitivity emissions which modifies sensitivity run design, but does not alter conclusions.

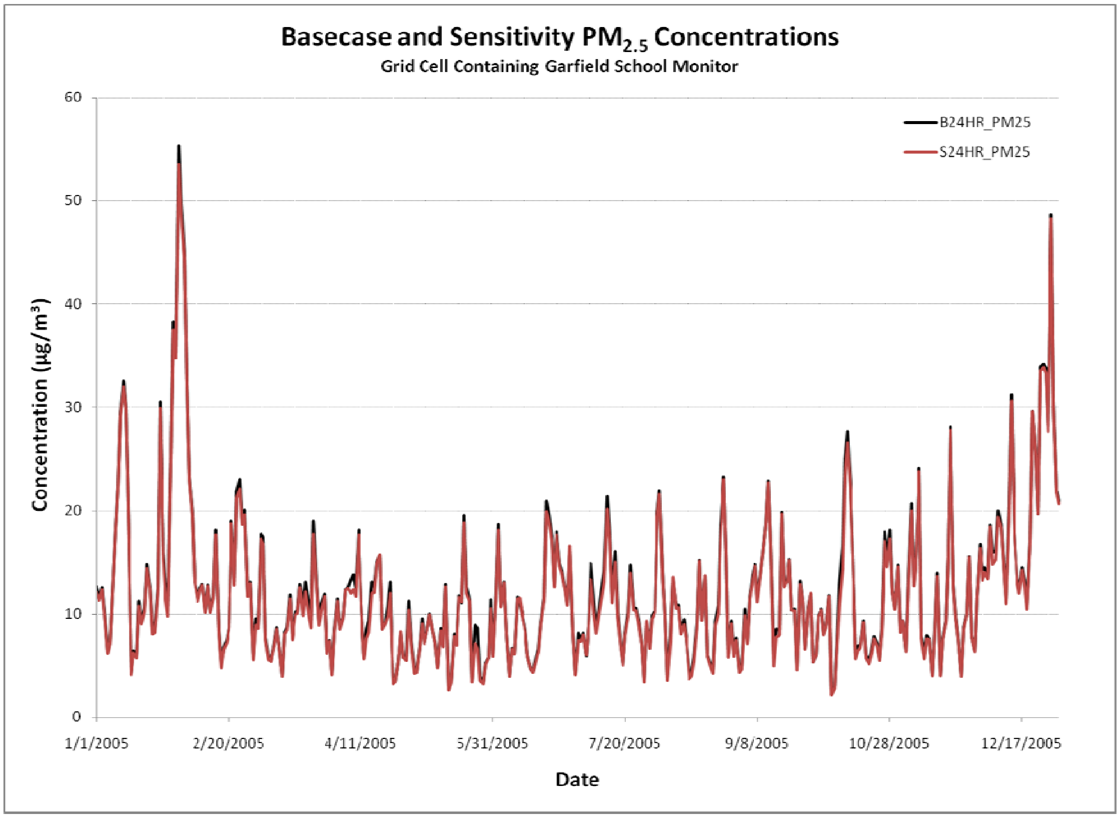

Figure 14. $PM_{2.5}$ concentrations for the basecase and rural Muscatine County sensitivity runs at the grid cell containing the Garfield School monitor.

9. CAMx Particulate Matter Source Apportionment (PSAT) Results

i. PSAT Results are consistent with Zero Out results

Only a very small percentage of sulfate and nitrate concentrations, about 1% of sulfates and 2% of nitrates, were attributed to Rock Island County. The PSAT simulation shows similar contributions on high days from Scott and Muscatine Counties to particulate sulfate and nitrate concentrations at the Blackhawk Foundry and Garfield School monitors, respectively.

ii. Methods

The CAMx photochemical model offers Particulate Matter Source Apportionment Technology (PSAT) as a sophisticated means of investigating how regions and sources contribute to particulate matter formation at any given receptor. The disadvantage of PSAT is that the computational resource requirements can be demanding, and total run times can easily exceed those needed for a small zero-out sensitivity analysis, such as the one completed by the IDNR. EPA Region 7, with assistance from the Kansas Department of Health and Environment (KDHE), implemented a PSAT simulation to augment the zero-out modeling runs being conducted by the IDNR.

The PSAT simulation was conducted using the Central States Regional Air Planning Association (CENRAP) national 36 km domain in combination with the 12 km domain developed by IDNR (see Figure 15). All necessary preprocessing and the model execution was completed by EPA Region 7 and KDHE. The model configuration, including emissions and meteorology, were based upon the 2002 Base E CAMx modeling system developed by CENRAP and their contractors for purposes of regional haze. The 12 km meteorology was flexi-nested (interpolated) from the 36 km grid. The source apportionment techniques were applied to SO_2, NOx, and primary particulate matter. The IDNR, in consultation with EPA, identified three primary source regions to assess $PM_{2.5}$ contributions: Rock Island County, IL, Scott County, IA, and Muscatine County, IA. The remaining 97 counties in Iowa were assigned a separate source region. All other areas in the 12 km domain were assigned a unique source region. Figure 16 provides the mapping of source regions within the 12 km domain. To account for fine particulate matter concentrations associated with out-of-state emissions, all areas outside the 12 km domain (modeled at 36 km resolution) were grouped into a single source region as a viable apportionment to long-range transport.

Using two discrete receptors, contributions attributable to the six specific source regions described above were calculated at the approximate locations of the Blackhawk Foundry monitor in Scott County and the Garfield School monitor in Muscatine County. These six source regions provide information necessary to address the contributions associated with county sources, long range transport, and the role of precursor pollutants associated with the NAAQS violations in Scott and Muscatine Counties.

iii. Results

Figure 17 and Figure 18 show the annual average contributions by source region for particulate sulfate and nitrate at the Blackhawk Foundry monitor receptor location, respectively. The majority of sulfate and nitrate concentrations originated from the continental U. S., outside the 12 km domain in Figure 15. About 68% of sulfates and approximately 60% nitrates originated from emissions in this source region. Only a very small percentage of sulfate and nitrate concentrations, about 1% of sulfates and 1% of nitrates, were attributed to Rock Island County. For 98th percentile and above particulate nitrate and sulfate concentrations, the average contribution from the continental U. S. source region, shown in Figure 19 and Figure 20, is even greater. Approximately 83% of particulate sulfate and 76% of particulate nitrate originate from emissions in the continental U. S., outside of the 12 km domain, for concentrations at or above the 98th percentile at the Blackhawk Foundry monitor receptor location. Less than 1% of sulfates and 1% of nitrates, on average, are traced back to Rock Island County for these same data. On these same days, less than 1% of the sulfates and less than 1% of the nitrates are attributable to Scott County. Long range transport is the dominant contributor to the high sulfate and nitrate concentrations.

The PSAT simulation shows similar contributions from outside the 12 km domain to particulate sulfate and nitrate concentrations at the Garfield School Monitor. Figure 21 and Figure 22 show, on average, 70% of the sulfate and 64% of the nitrate concentrations originate from source in the continental U. S. outside of the 12 km domain. Only 3% of particulate sulfate and 2% of particulate nitrate, on average, originated from within Muscatine County. For the highest 2% particulate sulfate and nitrate concentrations the contribution from the continental U. S. is even larger, as seen in Figure 23 and Figure 24. Approximately 85% of those sulfate and 79% of those nitrate concentrations are attributable to emissions outside the 12 km domain. Only 1% of particulate sulfate and 1% of particulate nitrate originated from emissions located within Muscatine County for these same data.

Negligible impacts, on the order of 1 to 3%, are attributable to the counties of interest. Local source impacts unresolved by the photochemical model, in combination with long range transport and the associated high background concentrations are causing or contributing to exceedances. The results support excluding Rock Island County, and the majority of Scott and Muscatine Counties, from a nonattainment designation.

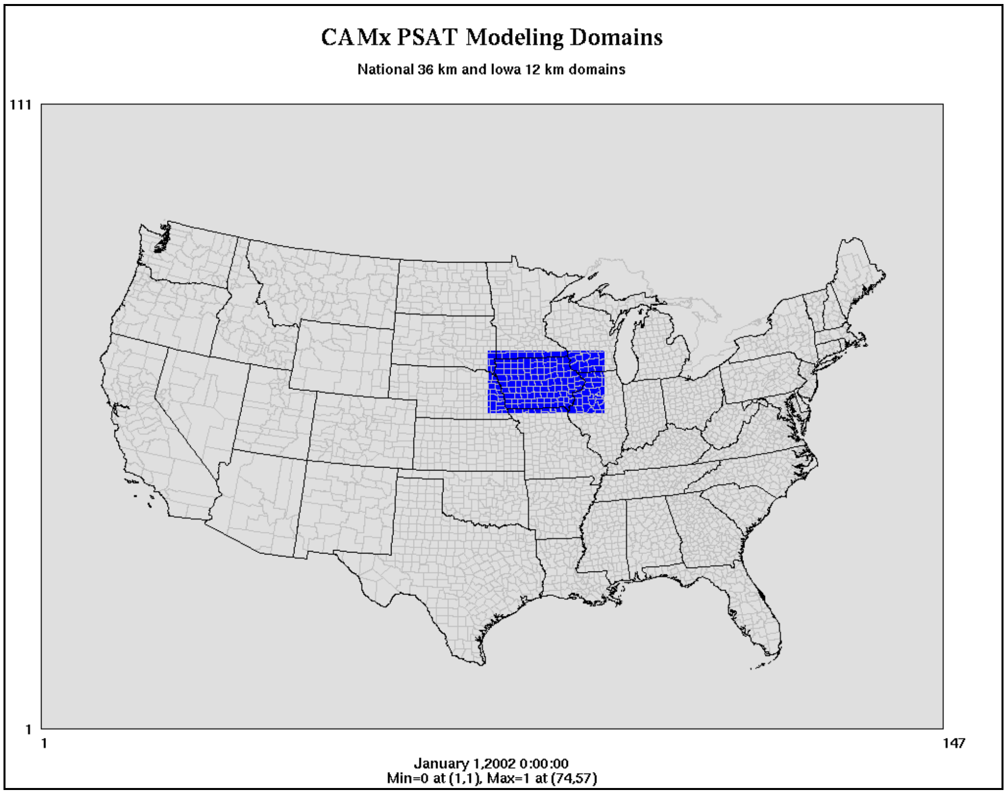

Figure 15. Spatial configuration of CAMx using the 36 km national domain and an IDNR 12 km domain (shown in blue).

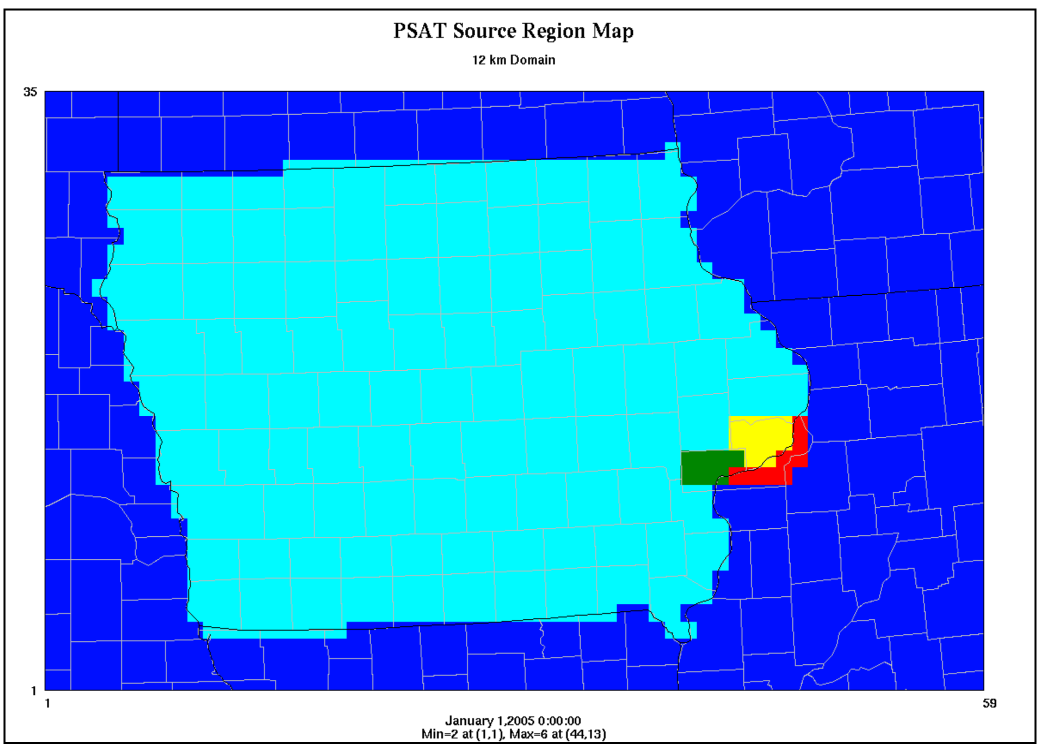

Figure 16. Color coded map showing five source regions in the 12 km domain tracked using PSAT. All areas outside this region were modeled at 36 km resolution, and tracked as a single source region.

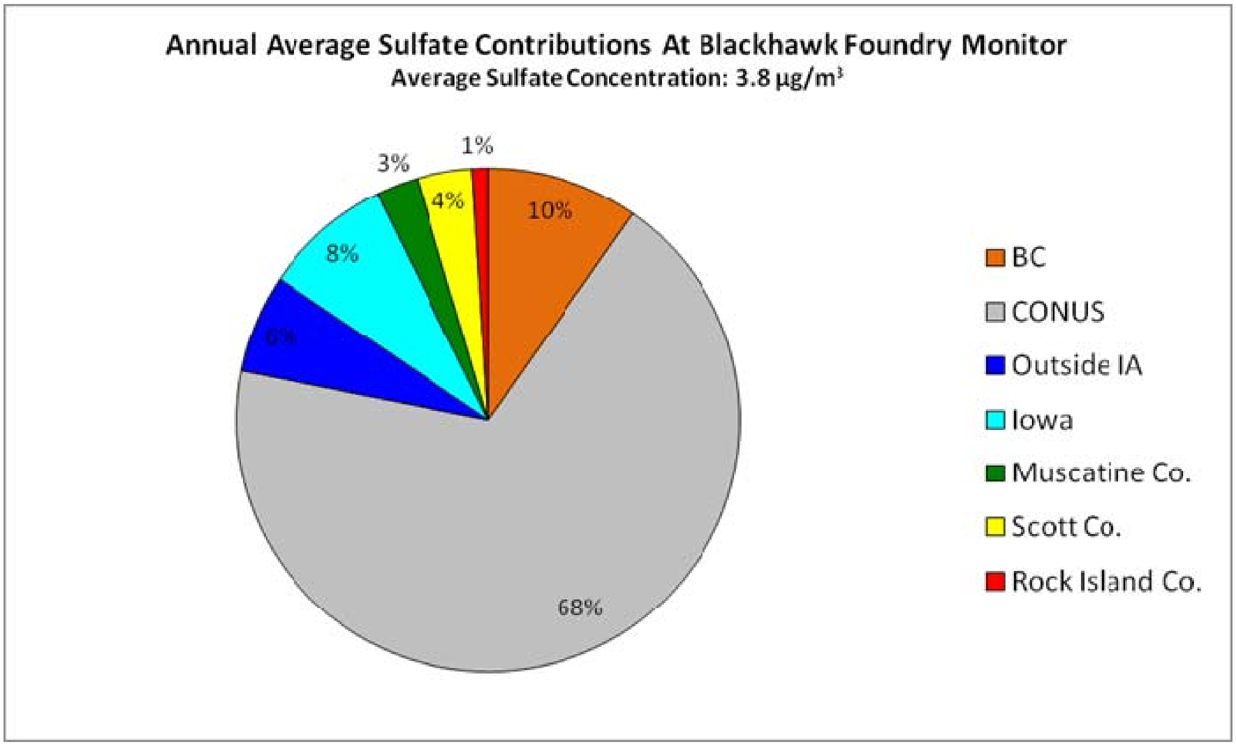

Figure 17. Annual average sulfate contributions by source region at the Blackhawk Foundry monitor location.

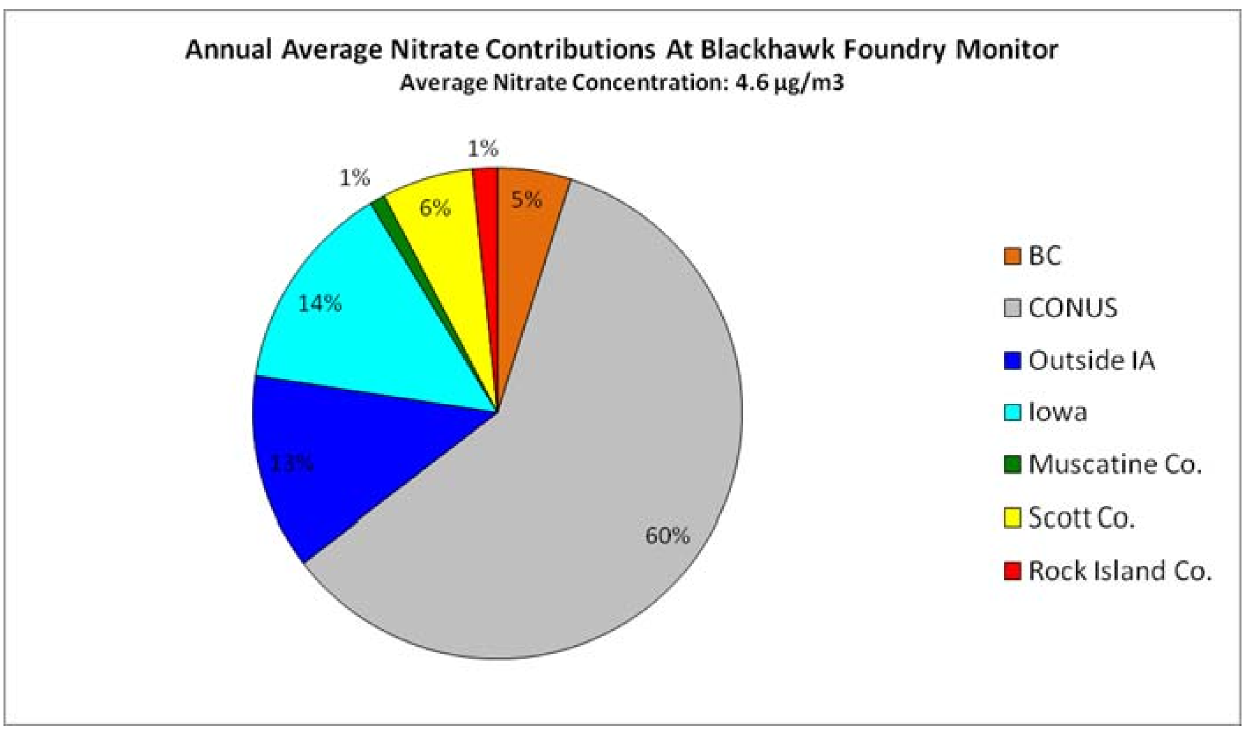

Figure 18. Annual average nitrate contributions by source region at the Blackhawk Foundry monitor location.

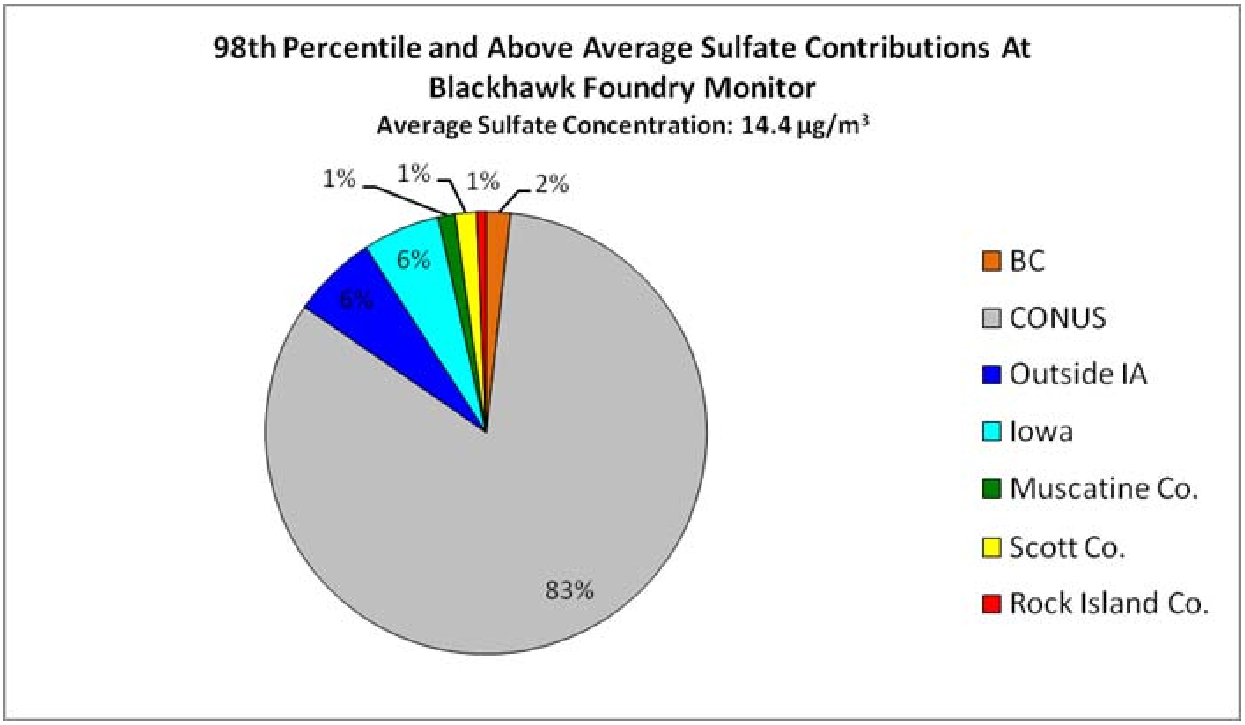

Figure 19. Average sulfate contributions by source region at the Blackhawk Foundry monitor for 98th percentile and above sulfate concentrations.

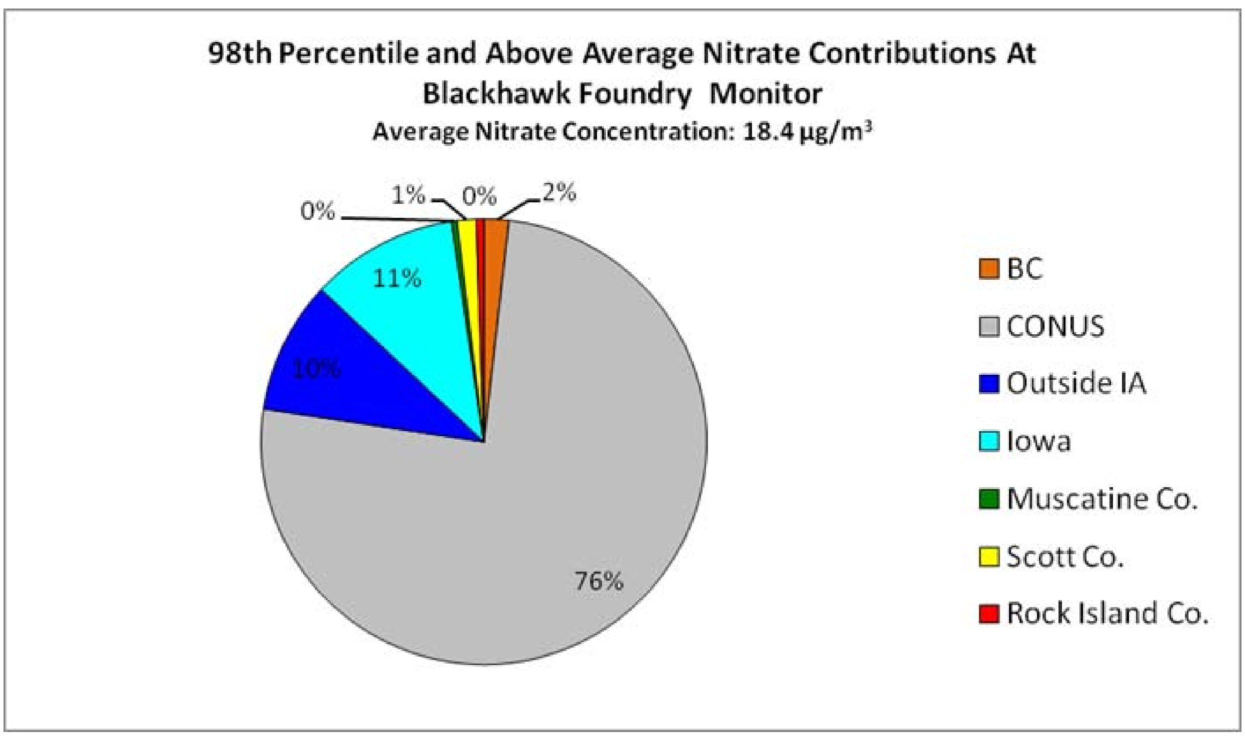

Figure 20. Average nitrate contributions by source region at the Blackhawk Foundry monitor for 98th percentile and above nitrate concentrations.

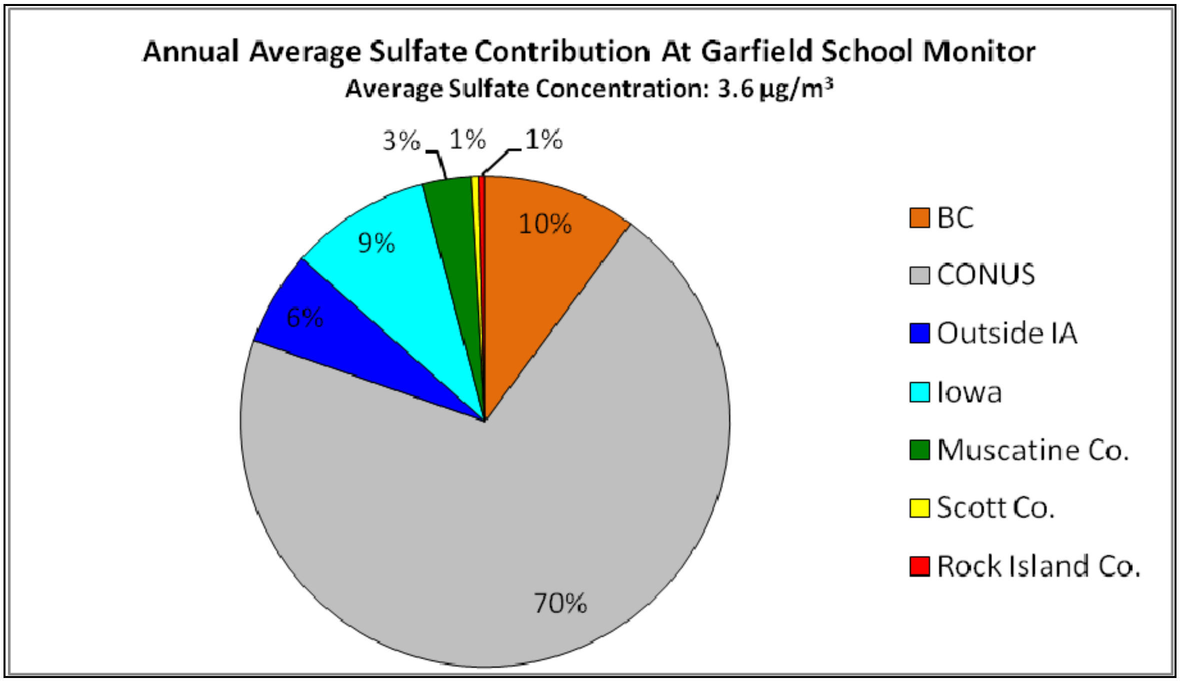

Figure 21. Annual average sulfate contributions by source region at the Garfield School monitor location.

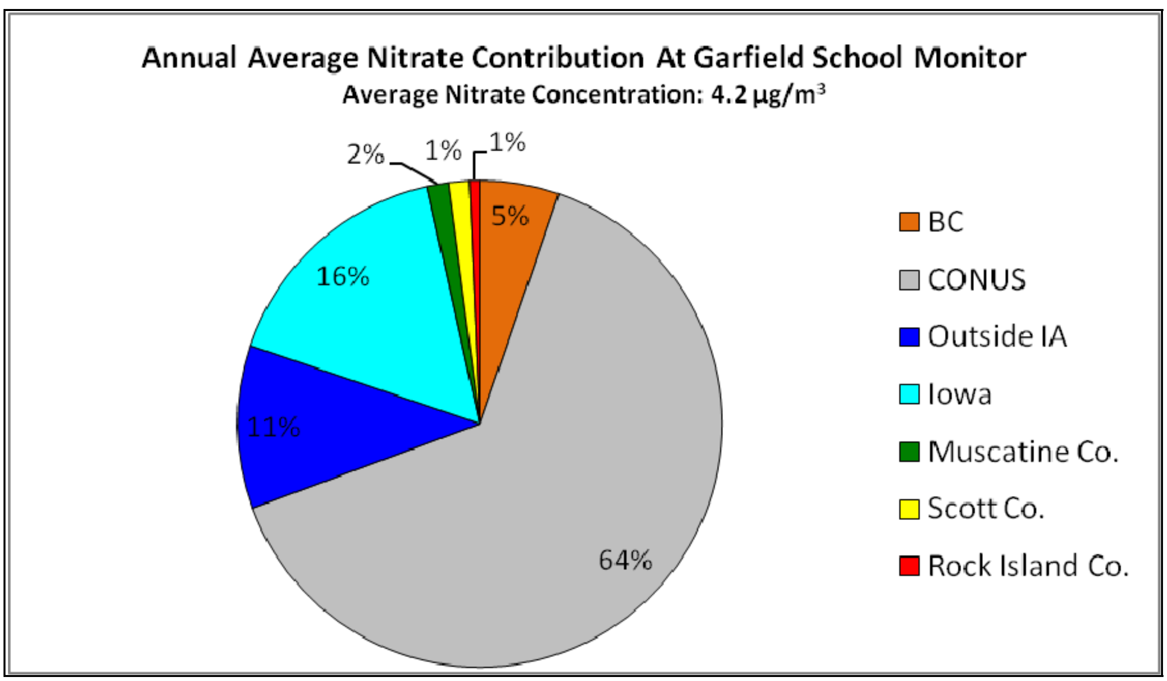

Figure 22. Annual average nitrate contributions by source region at the Garfield School monitor location.

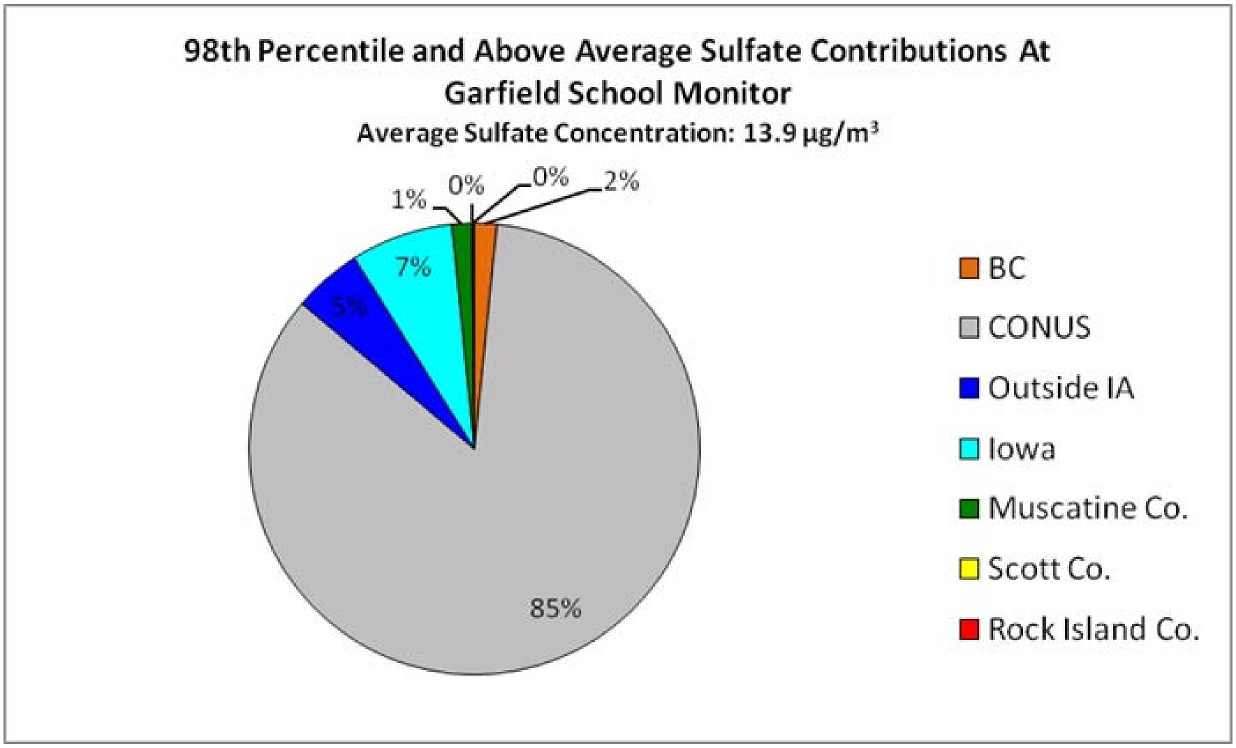

Figure 23. Average sulfate contributions by source region at the Garfield School monitor for 98th percentile and above sulfate concentrations.

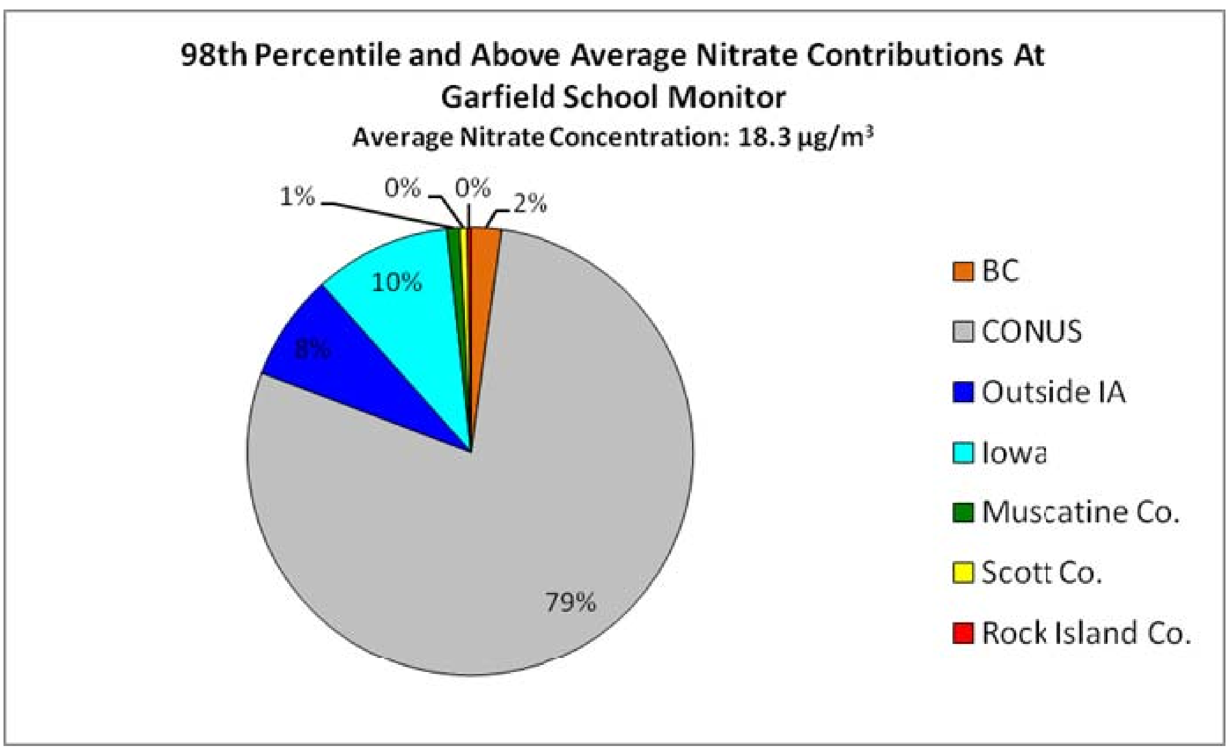

Figure 24. Average nitrate contributions by source region at the Garfield School monitor for 98th percentile and above nitrate concentrations.

IV. Additional Concerns Surrounding EPA's Proposed Boundaries

In addition to the analyses presented above, two other concerns associated with EPA's boundary recommendation must also be addressed.

A. Importance of Guidance

The use of arbitrary political boundaries to delineate the extent of the proposed nonattainment boundaries is not consistent with EPA's guidance. In the June 8th, 2007, "Area Designations for the Revised 24-Hour Fine Particulate National Ambient Air Quality Standards" guidance document, EPA stated that the Metropolitan Statistical Area presumptive boundary for areas violating the annual standard would not apply to areas violating only the 24-hour standard. In effect, no presumptive boundaries are to be assumed for any nonattainment area in Scott or Muscatine Counties. The EPA has given no technical consideration to sub-county boundaries. All technical analyses completed by EPA, for example the use of the Contributing Emissions Score (CES) analysis, have relied upon data aggregated to the county level. In effect, this approach has elevated the importance of the jurisdictional/political boundary factor above the other eight factors. This gives rise to the conceptual model of which sources and what conditions lead to $PM_{2.5}$ formation in a given area.

B. Concerns with the CES Analysis

The CES methodology is incapable of resolving scales finer than the county level, utilizes data during periods without a violation of the 24-hour $PM_{2.5}$ NAAQS, and is based upon unrepresentative speciated data. The boundaries should be determined based upon the analyses utilizing data corresponding to the nonattainment design values, 2005 – 2007. County-scale data as aggregated in the CES analysis is insufficient to resolve the impacts of the sources adjacent to the monitors and results in arbitrary county boundaries.

- As discussed above, the CES analyses utilized emissions, meteorology, and air quality data aggregated arbitrarily to the county level. The IDNR has provided greater detail in resolving the sources and conditions leading to nonattainment at the Blackhawk Foundry monitor in Scott County and the Garfield Elementary School monitor in Muscatine County. The analyses discussed above, in combination with the previous submittal of the nine-factor analysis data, highlights the importance of local sources unresolved by the CES analysis.
- The CES analysis utilized ambient data from 2004-2006. During this three year period there was no violation of the 24-hour $PM_{2.5}$ NAAQS in either Scott or Muscatine Counties. The 95th percentile monitoring values upon which the CES analysis is based thus does not capture those atmospheric conditions found in 2005-2007. Results from the CES analysis are thus not representative of the conditions which lead to nonattainment in eastern Iowa. Additional emphasis should be placed upon the State's nine factor analysis, which utilized 2005-2007 datasets.
- The CES analyses relied upon speciated data in derivation of a county's score. Speciated data are utilized to provide speciated estimates of regional background concentrations, concentrations at the exceeding monitor, and the urban increment. In calculating a background concentration for the Blackhawk Foundry monitor, the methods used incorporated a monitor in Decatur, Illinois, located 144 miles away, which is nearly the maximum 150 mile separation distance allowed. This monitor

yielded an average 2004-2005[9] cold season nitrate concentration of 9.6 μg/m^3. This site should not have been used as it is not characteristic of conditions in Iowa. For example, the two sites in Iowa used in calculation of the background, the Lake Seguma IMPROVE monitor and the chemical speciation site in Cedar Rapids, had cold season nitrate concentration of 17.2 and 20.9 μg/m^3. These values are nearly twice those found in Decatur, IL, and are more representative of the widespread winter time nitrate events that can occur in Iowa. The inclusion of the Decatur value artificially lowered the regional background concentration, leading to an increased urban increment value. These methods inflate the impacts attributable to the urban area, unnecessarily suggesting the need for larger nonattainment boundaries.

- Additional error is introduced by the use of inappropriate speciation data in calculation of the urban increment. Speciation data is not available at the Blackhawk Foundry or Garfield School monitors. The CES method thus interpolated available speciation data to the locations of the violating monitors. Considering the violating monitors are located adjacent to significant sources, the interpolation will not accurately apportion the contributions from the facilities, which are significant as described in the AERMOD model results discussed above. This results in speciated urban increments which are not representative of conditions at the violating monitors. As the speciated urban increments are directly proportional to the CES score, errors in the increment translate to errors in the CES score.

[9] 2006 data was not used by EPA in calculation of background concentration as IMPROVE data was not available for 2006.

V. Control Strategies

A. Control Strategy for Blackhawk Foundry

As demonstrated in the earlier sections of this response, analyses of local and regional contributions and exceedance events provide convincing evidence that the installation of additional air pollution capture and control technologies at Blackhawk Foundry will allow ambient air monitored values at the Blackhawk Foundry monitor to be equivalent to the monitored values at the other monitors located in Scott County, which show attainment with the standard. Blackhawk Foundry emissions control strategies developed jointly between Blackhawk Foundry and the IDNR are currently progressing from planning to implementation.

As demonstrated in Figure 25, these control strategies will assure implementation of real solutions on an expedited timeline that is much more likely to achieve attainment by 2014. Alternatively, delaying the development of a control strategy to include a geographically broader and more diverse emissions profile will delay the implementation of solutions for the small area impacted by emissions contributing to the violations. The federal timeline for establishing plans extends beyond what can be achieved by approaching the specific source of emissions impacting the monitor.

Blackhawk Foundry has agreed to begin voluntary implementation of a multi-phased control strategy well ahead of the federal timeline that is based on the Clean Air Act for developing and submitting a federally enforceable control strategy. These concrete reductions will resolve the local excess $PM_{2.5}$ contributions and will allow the area to monitor attainment by 2014.

Phase I of the control strategy includes replacing a natural gas fired oven with a zero $PM_{2.5}$ emissions electric oven and further limiting public access to facility property. Phase II will reduce ground-level concentrations by raising the Cupola Stack from 85 feet to 160 feet, and by raising the Mill Room and Sand System Scrubber stacks from 50 and 75 feet, respectively, to 100 feet. Phase III will add new capture equipment and a baghouse to control a number of processes at the facility including mold pouring and cooling, sand transfer, and mold making. Phase IV will reduce the entrainment of particulate in the material storage area and associated transfer points. Additional information regarding the Blackhawk control strategy can be found in Appendix M.

Implementation of this control strategy will reduce the predicted 5-year average of the 8^{th} High 24-Hour $PM_{2.5}$ concentration by approximately 75 percent by July 1, 2012 when Phase IV is completed (Table 7). Isopleth plots (Figure 26 through Figure 29) depict the decrease in spatial coverage of $PM_{2.5}$ impacts from Blackhawk Foundry that result from the completion of each project phase. The most significant decrease in $PM_{2.5}$ concentrations is predicted to occur with the completion of Phase III.

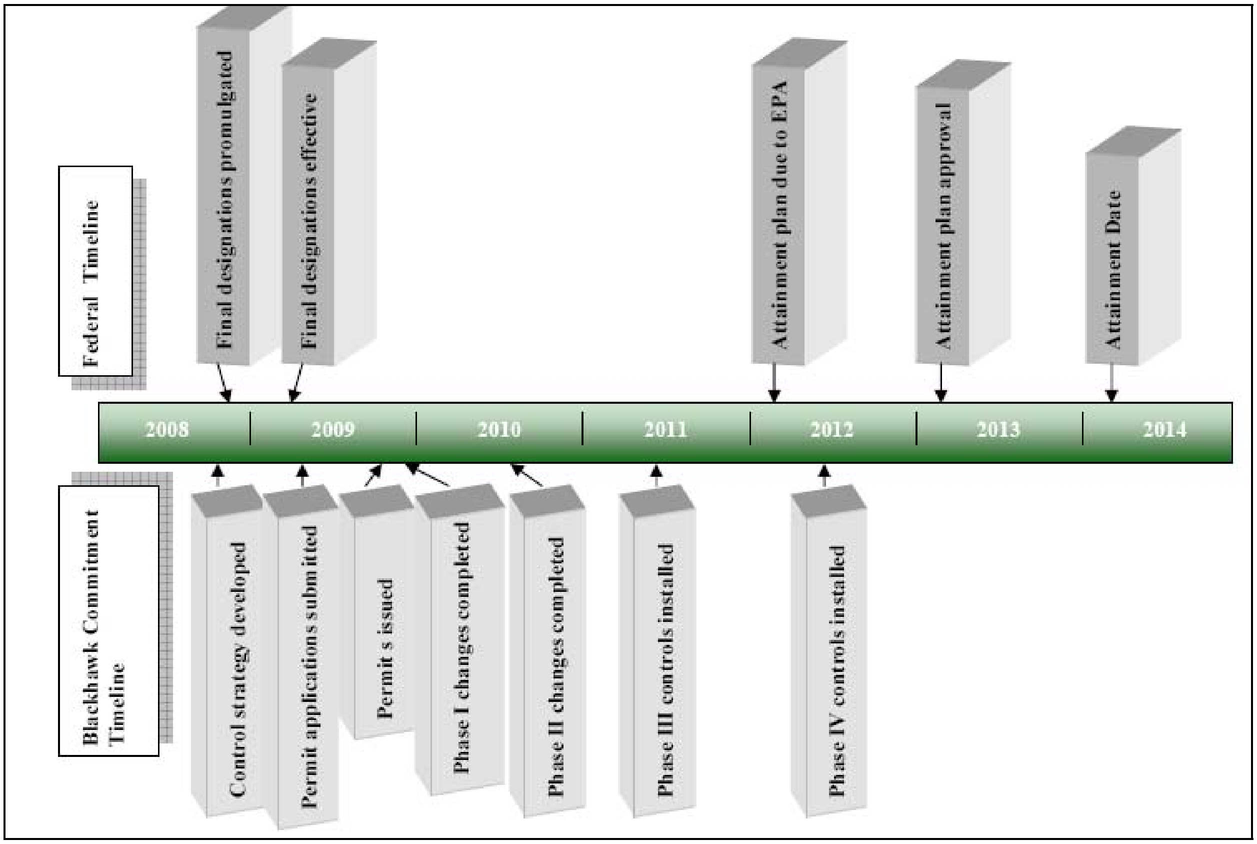

Figure 25. Comparison of Federal Timeline vs. Accelerated Control Strategy Implementation for Blackhawk Foundry.

Table 7. Predicted Incremental $PM_{2.5}$ Impacts for each Project Phase.

Blackhawk Improvements	8th High 24-Hour Predicted Ground Level Concentration ($\mu g/m^3$)	Annual Average Predicted Ground Level Concentration ($\mu g/m^3$)
Current (Base case)	24.71	5.67
Phase I	24.59	5.01
Phase II	20.29	4.53
Phase III	6.27	1.85
Phase IV	6.22	1.80

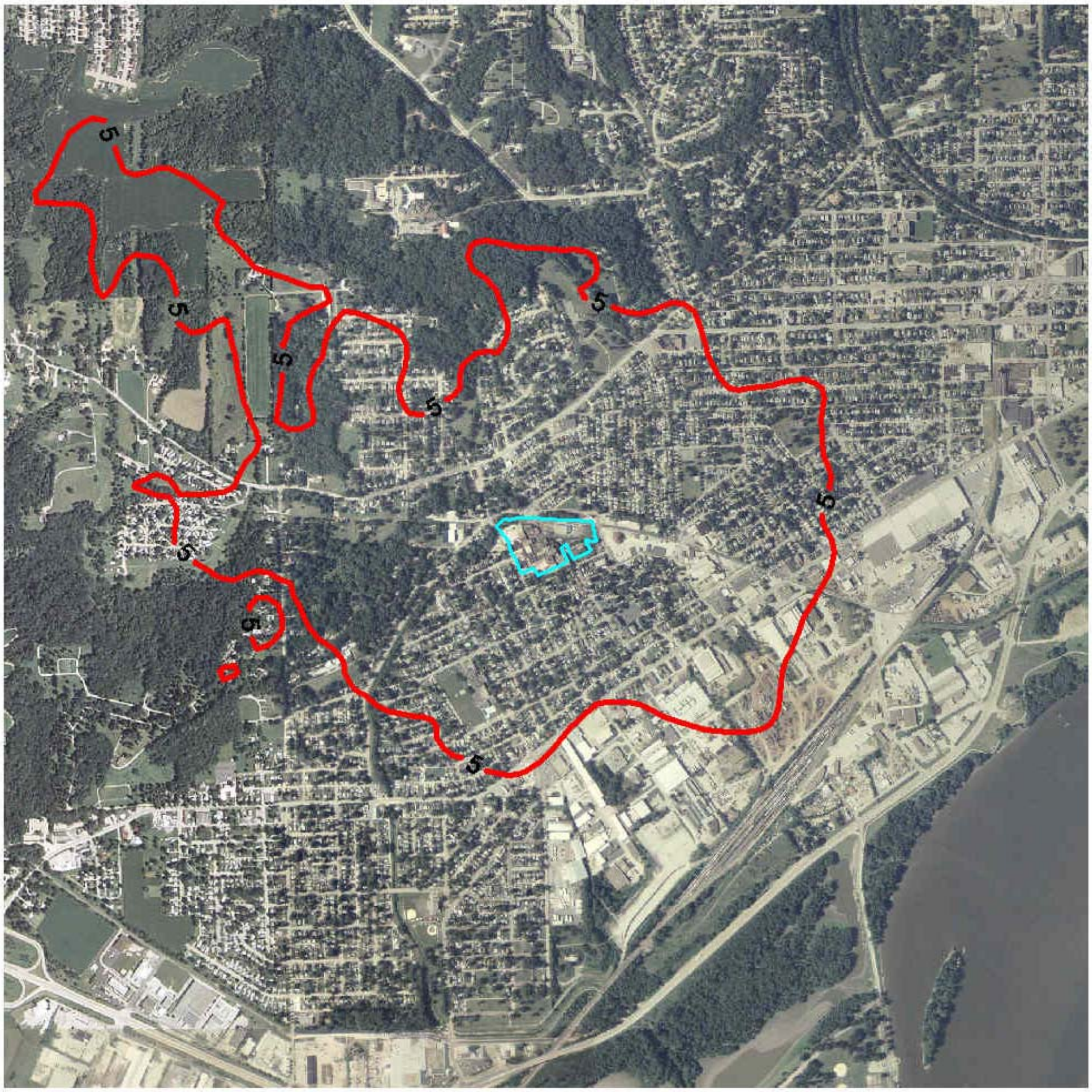

Figure 26. Location of 5 ug/m^3 Blackhawk Foundry isopleth- base case and completion of Phase 1.

Figure 27. Location of 5 ug/m^3 Blackhawk Foundry isopleth- completion of Phase 2.

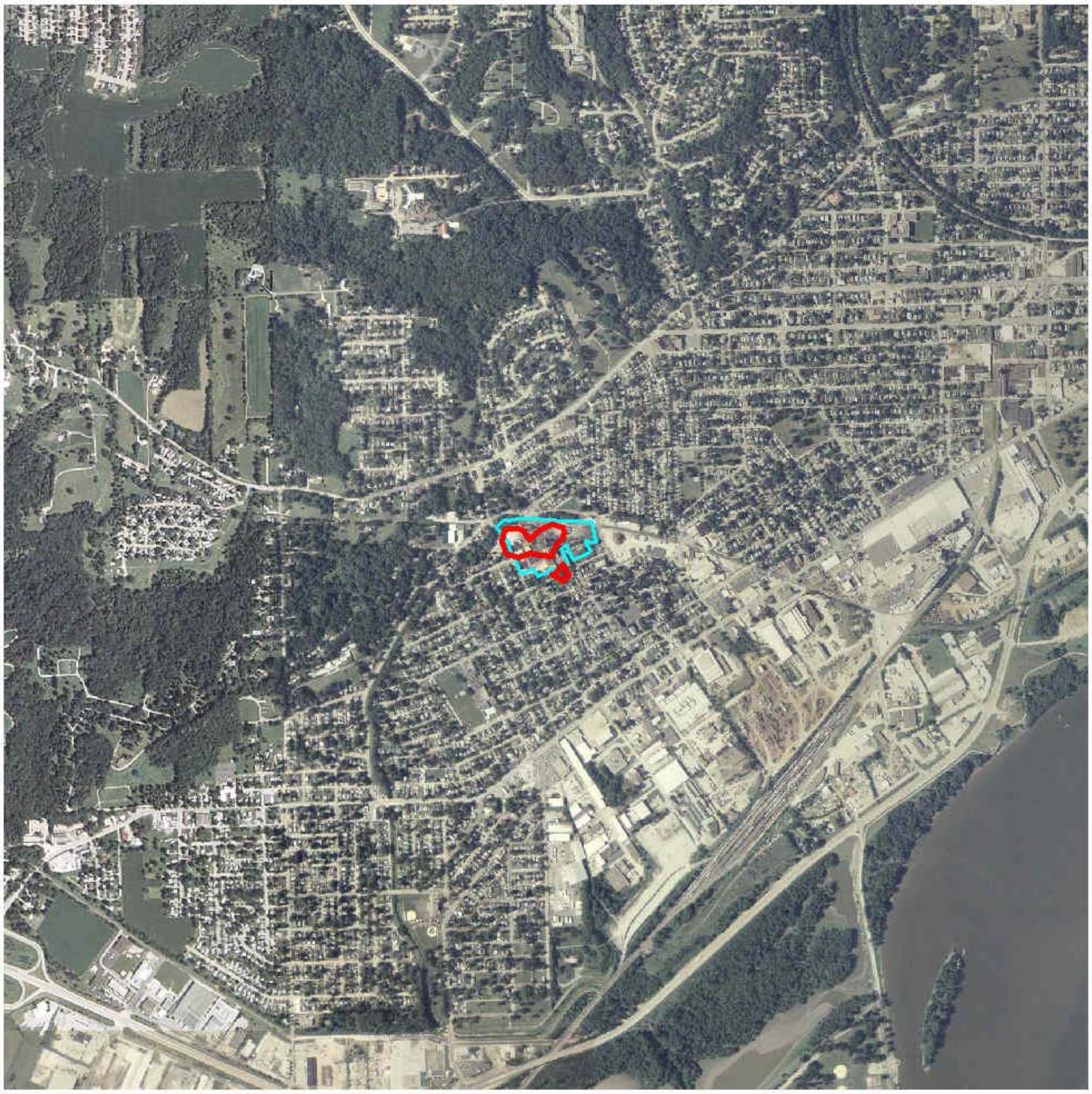

Figure 28. Location of 5 ug/m^3 Blackhawk Foundry isopleth- completion of Phase 3.

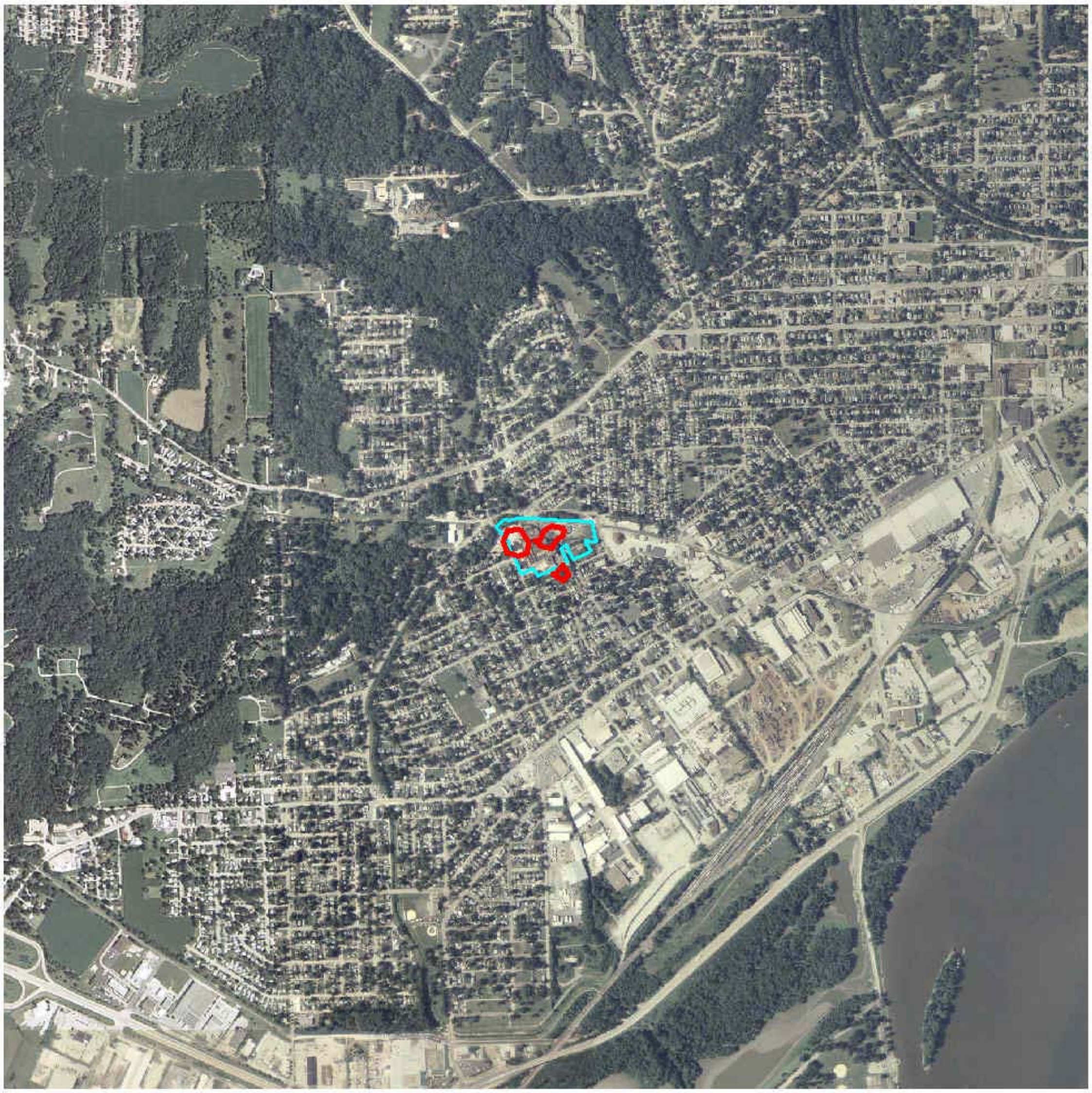
Figure 29. Location of 5 ug/m^3 Blackhawk Foundry isopleth- completion of Phase 4.

B. Control Strategy for Grain Processing Corporation (GPC)

Analyses of local and regional contributions and exceedance events at the Garfield Elementary monitor in Muscatine, IA provide convincing evidence that the installation of additional air pollution capture and control technologies at GPC will bring ambient air monitored values at the Garfield Elementary School monitor back in line with other monitors in the region that show attainment with the $PM_{2.5}$ standard. GPC emissions control strategies have tentatively been proposed by GPC.

As demonstrated in Figure 30, these control strategies could assure implementation of real solutions on an expedited timeline that is much more likely to achieve attainment by 2014. Alternatively, delaying the development of a control strategy to include a geographically broader and more diverse emissions profile will delay the implementation of solutions for the small area impacted by emissions contributing to the violations. The federal timeline for establishing plans extends beyond what can be achieved by approaching the specific sources of emissions impacting the monitor.

GPC has tentatively agreed to begin voluntary implementation of a multi-phased control strategy well ahead of the federal timeline based on the Clean Air Act for developing and submitting a federally enforceable control strategy. Implementation of the plan as proposed could resolve the local excess $PM_{2.5}$ contributions and allow the area to monitor attainment by 2014. A letter regarding GPC's plans for reducing $PM_{2.5}$ emissions in Muscatine is included in Appendix N. GPC has tentatively selected the option known as the "wet feed" option. This option has five phases as described below.

Phase 1 includes changes that will abate $PM_{2.5}$ through stack extensions on the Maltrin #4 Scrubber stacks, adding baghouses to the Expeller Building Germ Receiving and DHWH #1 Crown Cooler, and installing fans and stack extensions on the Dryer House 4 rotary dryer stacks. Changes in Phase 2 will reduce ambient air concentrations by shutting down Dryer Houses 1 and 2. Ground level concentrations will be decreased in Phase 3 by adding eight 40 foot exhaust stack extensions to the dry end aerodynes on the P&S Starch Dryers and increasing the stack height to 150 feet of two stacks located on the Starch #1 and #2 Flash Dryers. In Phase 4 ground level impacts from six Specialty Product area stacks will be reduced by venting the emissions to a baghouse or by extending the stacks to 90 feet. Gluten Plant 1 will be shutdown in Phase 5 and replaced with a new Gluten Plant 3 built with a low emitting, high efficiency, natural gas/biogas fired flash dryer, and new gluten filters and vacuum pumps.

Preliminary modeling completed by GPC but not yet provided to DNR for review indicates that implementation of this multi-phased control strategy would reduce the predicted 5-year 8^{th} High 24-Hour $PM_{2.5}$ concentrations in the vicinity of GPC by between 65 and 70 percent by 2014, when Phase 5 could be completed.

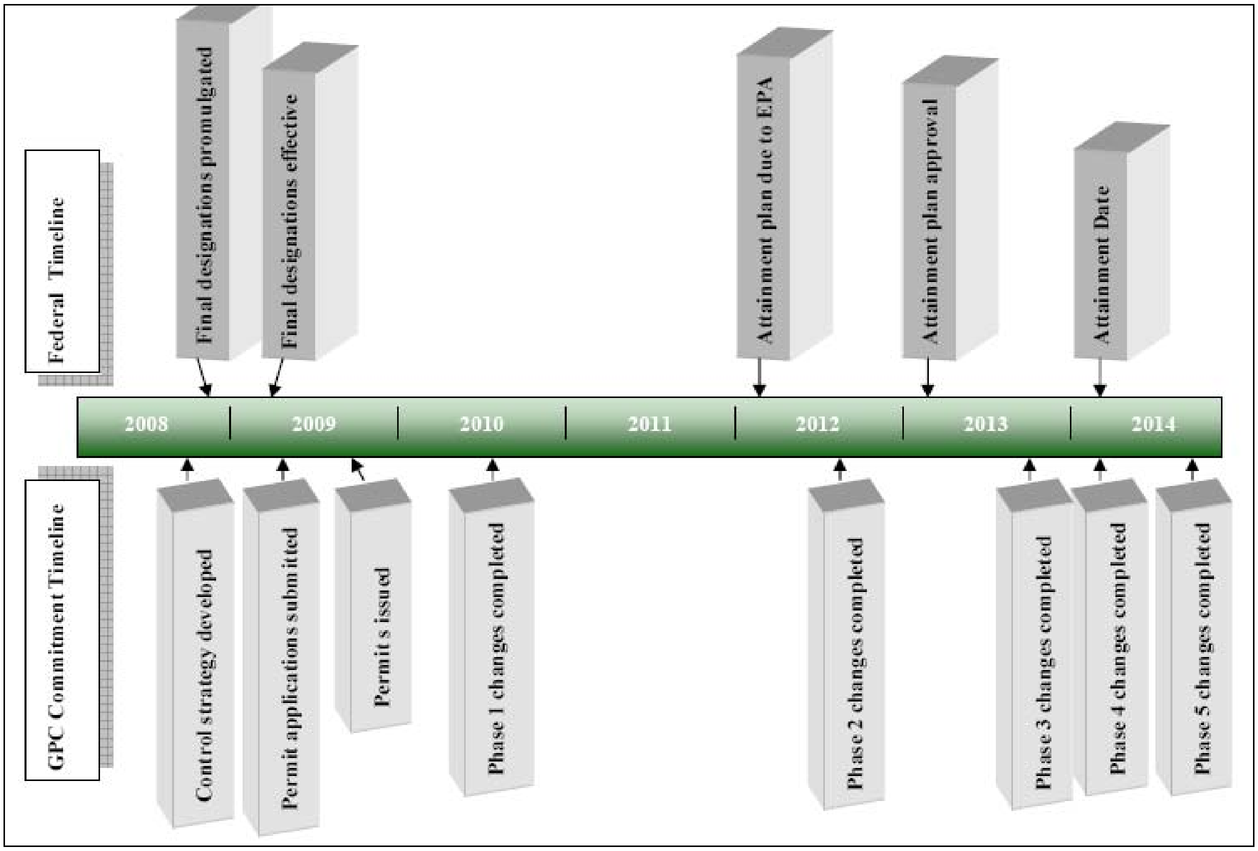

Figure 30. Comparison of Federal Timeline vs. Accelerated Control Strategy Implementation for GPC.

C. Air Quality Initiatives in Rock Island County, IL

The Quad Cities Area Air Quality Task Force, coordinated by the Bi-State Regional Commission (Bi-State), has been working to voluntarily reduce air emissions for the past decade. The mission of task force is to maintain attainment with national ambient air quality standards; facilitate communication on voluntary measures to reduce air emissions, and to provide support for voluntary measures including public education and mobile/stationary source reduction initiatives. The Task Force efforts were recognized as a success story for their work with the U.S. Department of Transportation and EPA collaborative program "It all adds up to cleaner air." More information is at http://www.italladdsup.gov/tools/successstories/SuccessStories_BiStateRegional.asp.

Bi-State continues to promote transportation alternatives in the Quad Cities via their website, http://www.bistateonline.org/qctransit/index.shtml. Recent Bi-State activities include an Aware of Air campaign, http://www.bistateonline.org/ser/env/aoa/aoa.shtml.

In addition to Bi-States' efforts, a number of Iowa and Illinois Quad City communities have undertaken voluntary emission reduction efforts. In the Illinois Quad Cities, Moline, Rock Island and the county public transit authority are taking steps to improve air quality in the region. Metro, the Rock Island County Metropolitan Mass Transit District, serves Rock Island, Moline, East Moline, Milan, Silvis, Carbon Cliff, Hampton, and Colona. Half of Metro's fleet is comprised of compressed natural gas buses. Metro is currently launching a new green initiative but has been promoting transit as a greener choice for a number of years. More information on the green initiative is at http://www.GoGreenMetro.com.

The City of Rock Island is committed to responsible environmental stewardship. Mayor Mark Schwiebert established the "Green Team" within the city departments to create a healthier, safer city that encourages and implements sustainable growth and maintenance of the community. The team's charter spans all aspects for municipal operation and includes making recommendations for potential ordinance changes to improve the overall quality of life in the community.

Current Green Team has developed successful alternative solutions to leaf burning in Rock Island, a source of $PM_{2.5}$. The City has offered innovative options to discourage leaf burning, such as 60,000 free leaf bags and free collection for 7 weeks each fall, and a year round drop-off site. Implemented green initiatives include enhanced street sweeping, assistance in paving of a large gravel parking lot, purchase of hybrid electric vehicles, and the purchase of a hydroelectric power plant which will supply nearly 50% of the City facilities' power needs. The Green Team has received regional recognition through the local Radish award, http://radishmagazine.com/stories/display.cgi?prcss=display&id=367315, and statewide recognition by receiving two Lt. Governor's Environmental Hero award, http://www.standingupforillinois.org/feature.php?id=300.

The City of Moline applied for the Midwest Clean Diesel Initiative grant through EPA Region 5 to replace heavy duty diesel trucks with cleaner engines. Bi-State and the City of Moline met with EPA Region 5 in order to prepare a more competitive grant application for a future grant opportunity. The next proposal may include working with other local governments to increase the number of vehicles and incorporating retrofit technology with replacements as part of the proposal. In addition, the City Council of Moline recently discussed a leaf burning ban. Details are at http://www.qctimes.com/articles/2008/09/24/news/local/doc48d9beb0ec2de441140042.txt?sPos=3.

The on-going implementation of current initiatives and plans for future initiatives demonstrate a commitment at both the local and county levels to long term air quality protection strategies. These initiatives, when combined with the proposed control strategies for Blackhawk Foundry and GPC, further demonstrate that efforts to include a geographically broader and more diverse emissions profile would only delay the implementation of targeted solutions for the small area impacted by emissions contributing to the violations.

VI. Nine Factor Analysis Revisited

The dispersion modeling results have quantified the impacts attributable to the local sources near the violating monitors. Photochemical grid modeling contribution assessments reveal the remaining contributions are dominated by sources outside Muscatine, Scott, and Rock Island Counties. These results are consistent with and support the conceptual model of source contributions derived from data analysis and review of the nine factor analysis.

A. Scott County

Figure 31 contains the windrose corresponding to the days in which 24-hour exceedances occurred during 2005-2007. The windrose is centered on the Blackhawk Foundry monitor and overlaid on a map of the area. All major point source facilities with a significant emission rate for any of the presumptive species regulated under new source review ($PM_{2.5}$, NOx, or SO_2) are also shown. The significant emission rates correspond to the values promulgated by EPA in the "Implementation of the New Source Review (NSR) Program for Particulate Matter Less Than 2.5 Micrometers ($PM_{2.5}$)" final rule (73 FR 28321). The significant emissions rate for direct $PM_{2.5}$ is 10 tons per year (tpy), and 40 tpy for both SO_2 and NOx. In Figure 31, only Blackhawk Foundry meets the criteria. The majority of the exceedances occur under conditions which have a high potential for Blackhawk Foundry to be causing or significantly contributing to the exceedances. A wider view of source locations in relation to the monitor is shown in Figure 32, along with the exceedance day wind rose for the 10th & Vine monitor.

Causal impacts from Blackhawk Foundry at the adjacent monitor are strongly inferred from Figure 31. Contributions from Blackhawk Foundry quickly diminish with distance. Supporting evidence is found in the 10th and Vine windrose by the decrease in the magnitude of the southwesterly petals oriented towards Blackhawk Foundry. A strong southerly component is seen in the 10th and Vine windrose. This component is also present at Blackhawk Foundry, but is diminished in magnitude due to the strong south-southwesterly signal attributable to contributions from Blackhawk Foundry. Other than Blackhawk Foundry next to the 300 Wellman Street monitor, there are no significant emissions sources in the area south of the monitors. The strong southerly component at 10th and Vine is not attributably to any nearby source but is the result of longer range transport and associated high background concentrations.

At both sites an easterly wind direction has occurred during exceedances. From these data it is possible to qualitatively derive that sources in Rock Island County are not major contributors. Table 8 provides a breakdown of exceedances monitored in Iowa during 2005 – 2007. The data are organized by site and date, and color coded according to 24-hour average concentration. The exceedance events in which an easterly wind direction (60 - 120 degrees) was measured for at least 8 hours during a day have been outlined. Six of 12 days contain exceedances only at the Garfield Elementary School monitor in Muscatine County. The remaining 6 days either produce exceedances at all monitors in the State operating on that day, or yield high or exceedance concentrations across broad regions of the State.

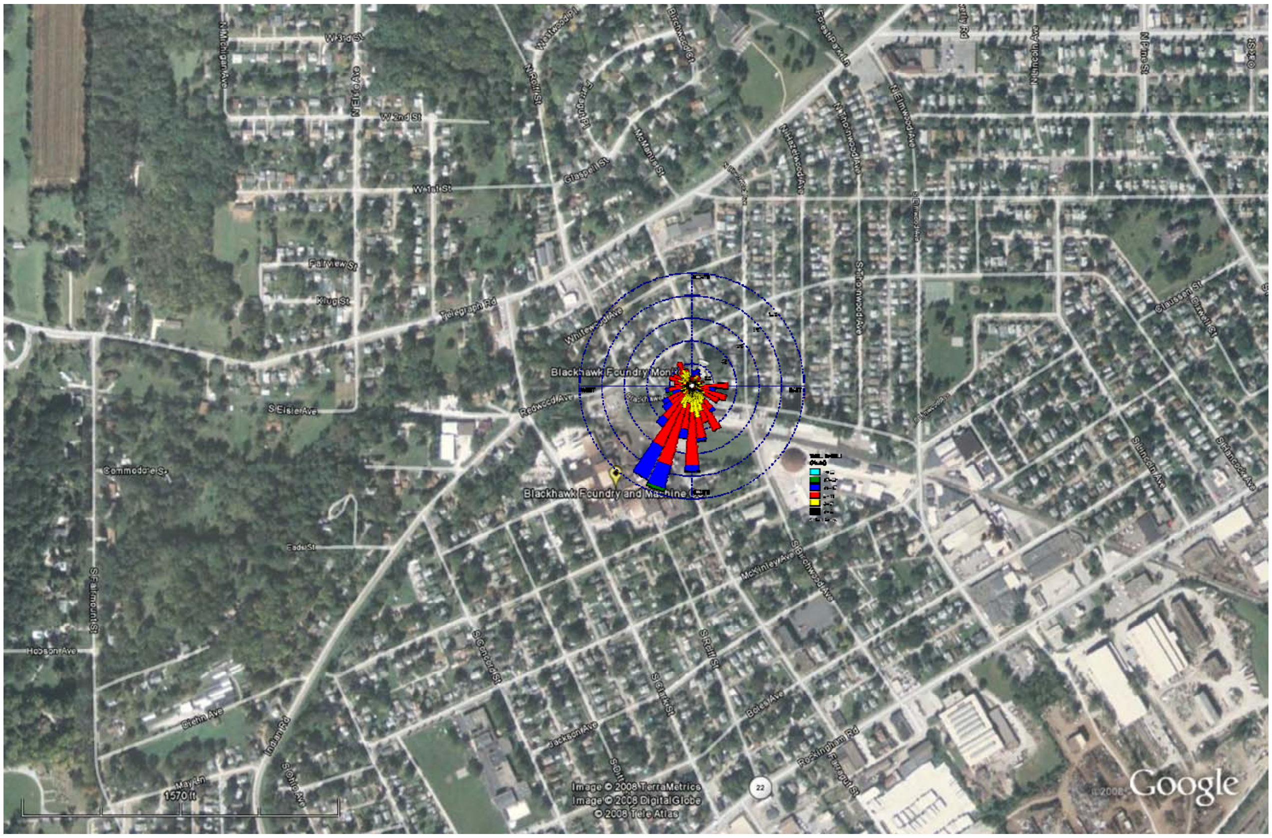

Figure 31. Windrose for exceedances measured at the Blackhawk Foundry monitor during 2005 -2007.

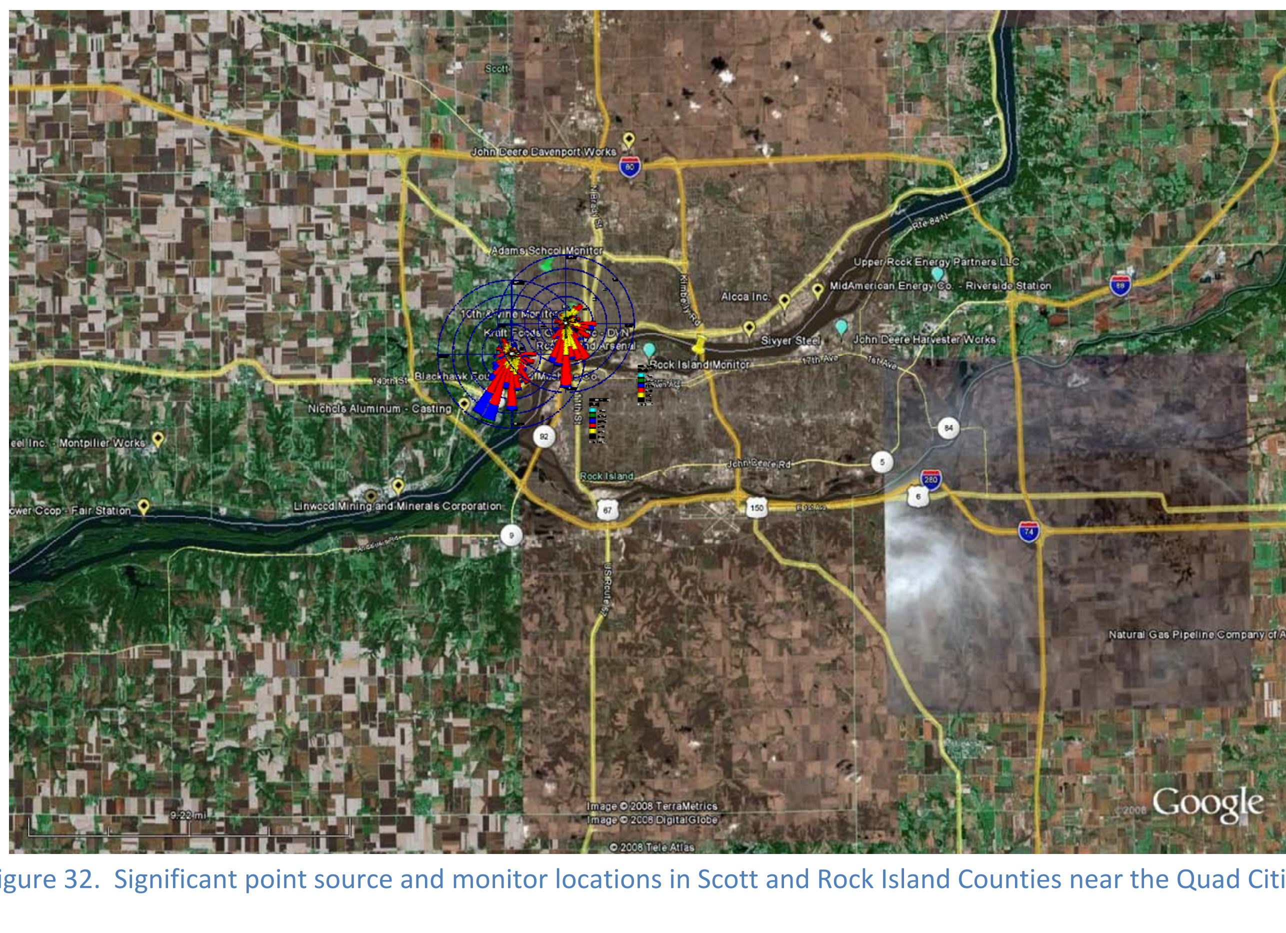

Figure 32. Significant point source and monitor locations in Scott and Rock Island Counties near the Quad Cities.

Table 8. Analysis of monitored exceedances in Iowa during 2005-2007. Boxed dates indicate days with at least 8 hours with an easterly wind direction (between 60 and 120 degrees). Blacked squares indicate no measurement was available.

Scale
No Data
$0<x\le20$
$20<x\le25$
$25<x\le30$
$30<x\le35$
$35<x\le40$
$40<x$

Ex te	Waverly, Airport	Keokuk, Fire Station	Des Moines, Nat. By-Products	Backbone State Park	Des Moines, Cornell Elementary	Clive, Indian Hills Sch.	Keosauqua, Lake Sugema	Viking Lake State Park	Emmetsburg, Iowa Lakes Coll.	Clarion, Jannsen Farm	Council Bluffs, Franklin Sch.	Sioux City, Lowell Sch.	Davenport, Adams Sch.	Waterloo, Grout Museum	Des Moines, Public Health Bldg.	Clinton, Chancy Park	Clinton, Rainbow Park	Cedar Rapids, Army Reserve	Iowa City, Hoover Sch.	Davenport, Jefferson Sch.	Muscatine, Garfield Sch.	Davenport, BH Foundry	Exceedance Count
1/11/2005								36.0							37.7			28.3		18.9			2
1/30/2005															42.9			40.0		36.7			3
1/31/2005					48.8	48.5	32.9	43.7	40.6	51.7	51.7	47.2	30.9	53.2	47.0		33.6	45.0	47.6	30.7	36.6	33.1	12
2/1/2005															45.9			48.3		40.2			3
2/2/2005															44.0			37.7					2
2/3/2005					24.7	23.1	28.0	22.7	18.4	26.5	27.3	19.4	34.9	35.1	25.5		41.2	35.4	41.0	37.0	35.7	40.0	5
6/24/2005					32.5	32.2	34.4	33.0	13.0	22.9	30.0	17.8	31.4	28.7	33.1		31.0	29.6	32.9	30.5	30.6	36.8	1
6/27/2005							30.8	25.4	24.0	24.6	23.9	25.2	37.5	28.9			39.4	34.9	35.5	37.6	37.3	41.7	6
8/2/2005					25.3	24.4	35.6	19.9	20.9	25.8	20.5	19.8	44.5	32.0	24.3		45.3	40.8	41.2	44.0	43.6	50.5	8
9/10/2005					29.1	28.9	29.9	31.4	27.7	29.5	29.5	30.1	35.3	29.7	28.5		35.3	34.4	32.5	35.0	33.6	36.9	1
9/11/2005															32.7			39.2		40.5			2
9/12/2005															34.4			37.9		39.6			2
9/13/2005					17.5			15.1	3.5	17.7	8.8	4.9		19.8	18.8		24.3	21.5	22.7	24.2	23.1	41.2	1
12/21/2005								20.1	21.4	26.7	23.0	21.3	11.1	35.7	18.2		39.7	32.7	39.1	31.4	36.8	32.7	4
12/24/2005					11.5	11.0	20.8	7.4	8.4	10.4	8.5	5.5	36.8	23.5	9.5		36.6	26.2	29.6	35.8	33.8	35.8	4
8/18/2006	23.0						19.7	8.0	36.4	27.8	8.3	9.6	22.1	17.9	10.5	29.3	26.5	12.5	13.8	20.6	15.4	22.7	1
11/7/2006	6.5		4.4				15.2	4.6	7.5	9.9	10.9	10.8	27.2	14.2	6.3	35.5	36.5	18.3	19.8	28.6	18.7	30.7	2
11/25/2006	19.7		20.6			22.4	25.7	21.9	11.7	25.0	21.7	14.7	35.4	35.8	24.0	50.9	50.7	36.8	36.7	38.0	32.5	36.2	7
2/23/2007	8.3	15.9	15.2			12.9	15.4	4.7	10.5	10.3	6.3	12.1	9.0	12.0	13.9	9.7	8.9	9.5	9.2	9.5	44.0	10.6	1
2/24/2007													9.0				8.6		10.9	9.1	53.2	10.0	1
2/28/2007															18.8		20.8		19.4	19.1	54.7		1
3/7/2007	25.9	15.4	32.1			31.9	14.8		30.9	33.3	37.7	36.7	18.8	28.7	32.4	18.2		24.0	18.8	18.2	22.4	19.9	2
3/9/2007																	37.3		41.9	42.1	41.5	44.2	5
5/3/2007	11.3	22.0	13.7			15.1	17.0	17.9		15.3	15.4	15.2	8.0	12.2		9.8	8.2	10.2	9.3	9.1	42.2	8.9	1
5/4/2007															25.9		15.6		19.2	15.0	61.0	16.1	1
5/5/2007															21.0		21.7		26.5	23.3	63.2	23.3	1
5/23/2007															15.9	37.0	23.3		17.0	23.0	20.2	32.6	1
5/30/2007	16.5	21.3	16.0			14.3	20.0	10.0	7.9	14.0	8.3	8.1	27.0	17.8	13.7	36.6	28.6	21.6		27.0		27.7	1
6/16/2007												27.4					29.6		32.8		31.8	35.6	1
7/25/2007							26.5								20.3		29.5		35.7	27.0	32.9	33.9	1
7/26/2007	25.2	33.7	23.0			24.1		20.7	16.2		19.6	18.8	30.3	23.9	22.2	31.1	30.5	25.9	28.7	28.1	32.3	36.0	1
9/21/2007	16.9	24.8	19.7	16.2		18.1	21.9		13.7	15.7	16.1	11.9	24.2	17.0	17.9	28.8	26.9	19.9	22.2	23.9	22.0	37.4	1
11/19/2007															20.0		26.1		25.6	27.4	25.5	39.1	1
11/20/2007		17.4	22.6	28.7		20.2	16.5	22.7	19.9	24.3	21.0	18.1	34.3	27.7	18.7	33.2	32.5	25.3	36.9	35.8	27.5	38.3	3
12/17/2007		29.7	28.9	32.0			21.6		21.5	36.4	33.0	27.4	31.9	37.5	27.9	35.6	32.0	30.0		28.5		38.2	4
12/19/2007																			54.8	57.2	54.9	56.8	4
12/20/2007		29.2		51.5		32.6	26.4		38.4	48.0	49.1	45.7	46.0	63.0	32.2	44.3		53.4	47.4	45.3	47.6	47.5	13
Exceedance Count	0	0	0	1	1	1	1	2	3	3	3	3	4	5	5	6	8	9	11	13	14	17	110

The impact of emissions from Rock Island County are minimal and do not contribute to the NAAQS violation. The elevated concentrations on the six days with exceedances in Scott County, with a significant easterly component, are the result of long range transport. As shown with the dispersion model, on average over 20% of $PM_{2.5}$ monitored on those exceedance days with a local source signal is attributable to Blackhawk Foundry. Emissions from Blackhawk Foundry cause and contribute to the NAAQS violation. The cumulative impacts of sources outside Scott, Muscatine, and Rock Island Counties are responsible for the high background concentrations. The elevated background concentrations are also causing and contributing to the NAAQS violation. Modeling conducted by IL EPA, IDNR and, EPA support this conclusion. The appropriate nonattainment boundary is confined to a small area around Blackhawk Foundry, excluding all of Rock Island County and most of Scott County.

No significant sources are located in Rock Island County to the south or southwest of the monitor. In the analysis of the meteorological data on high $PM_{2.5}$ days at the Blackhawk Foundry monitor, EPA concludes "In other words, sources of emissions, located immediately south-southwest of the monitor, most likely contributes to the violation of the 24-hour NAAQS for $PM_{2.5}$." The technical data presented clearly establishes the importance of the adjacent source. Locations in Rock Island County south-southwest of the Blackhawk Foundry monitor are dominated by rural activities. Rock Island County should not be included in the nonattainment area.

Population and growth were also considered in the nine-factor analysis. EPA stated in their boundary proposal that "A county with rapid population growth is generally an integral part of an urban area and likely to be contributing to fine particle concentrations in the area." A negative population growth rate occurred in Rock Island County between 2000 and 2005. Based upon population projection data collected by the Bi-State Regional Commission, the population of Rock Island County will continue to decline in the future. In relation to 2005 estimates, by 2010 the population of Rock Island County is forecast to decrease by 2.1%. Forecasts out to 2015 predict an additional population declines, to -2.4%. The evidence supports the exclusion of Rock Island County from the nonattainment area in Scott County.

B. Muscatine County

The windrose corresponding to the days in which 24-hour exceedances occurred during 2005-2007 is contained in Figure 33. The windrose is centered on the Garfield school monitor and overlaid on a map of the area. All major point source facilities with a significant emission rate for any of the presumptive species regulated under new source review - $PM_{2.5}$, NOx, or SO_2, are also shown. The significant emission rates correspond to the values promulgated by EPA in the "Implementation of the New Source Review (NSR) Program for Particulate Matter Less Than 2.5 Micrometers ($PM_{2.5}$)" final rule (73 FR 28321). The significant emissions rate for direct $PM_{2.5}$ is 10 tpy, and 40 tpy for both SO_2 and NOx. In Figure 33, only GPC and Muscatine Power and Water Foundry meet the criteria. The majority of the exceedances occur under conditions which have a high potential for GPC to be causing or significantly contributing to the exceedances.

Causal impacts from GPC at the Garfield monitor are strongly inferred from Figure 33. A dominant easterly component is seen in the exceedance windrose. Other than GPC, the only other significant emissions sources in the area east/southeast of the monitor is Muscatine Power and Water. The strong easterly component at Garfield school indicates that the exceedances are attributable to only these nearby sources, or high background concentrations associated with long range transport on the days when many monitors in the region measured exceedances of the standard.

The EPA agreed that a large percentage of easterly winds occurred on the exceedance days in 2005-2007. EPA then noted that the meteorology factor was also considered in the Contribution Emission Score (CES) analysis. The CES analysis does not adequately resolve local scale impacts and contains numerous limitations discussed previously. The boundaries proposed by EPA fail to adequately acknowledge the critical importance of the local source.

Referring back to Table 8, nine of the fourteen exceedances monitored at Garfield School are characterized by easterly winds (an easterly wind direction (60 - 120 degrees) was measured for at least 8 hours during a day). Of those 9 days, 6 correspond to exceedances which occur only at the Garfield school monitor, with monitored concentrations reading on average nearly 40 $\mu g/m^3$ higher than the non-source oriented monitors in adjacent Scott County. A strong local source signal produced by GPC is evident from these data.

The remaining 3 days with significant easterly winds either produce exceedances at all monitors in the State operating on that day, or yield high or exceedance concentrations across broad regions of the State. A wider view of source locations in relation to the monitor is shown in Figure 34. There are no major point sources with significant emissions rates located in any portion of Muscatine County not shown in Figure 34. The majority of Muscatine County is rural with nearly 70% of the $PM_{2.5}$, NOx, and SO_2 emissions emitted from GPC and Muscatine Power and Water. The majority (~28%) of the remaining emissions are attributable to Central Iowa Power Cooperative – Fair Station (CIPCO Fair Station).

The windrose data suggests CIPCO Fair Station is not causing or contributing to the NAAQS violation, and need not be included in the nonattainment area. Regional modeling results support this conclusion, and further reveals all sources in rural Muscatine County have negligible impacts, cumulatively on the order of 1 to 2% of total $PM_{2.5}$ concentrations. Geographically, GPC and Muscatine Power and Water are the only sources with significant emissions rates in or near the city of Muscatine. The dispersion modeling supports that emissions from GPC cause and contribute to the NAAQS violation. The cumulative impacts of sources outside Scott, Muscatine, and Rock Island Counties are responsible for the high background concentrations. The elevated background concentrations associated with long range transport are causing and contributing to the NAAQS violation. Modeling conducted by IL EPA, IDNR, and EPA Region 7 support this conclusion. The appropriate nonattainment boundary is confined to a small area near GPC.

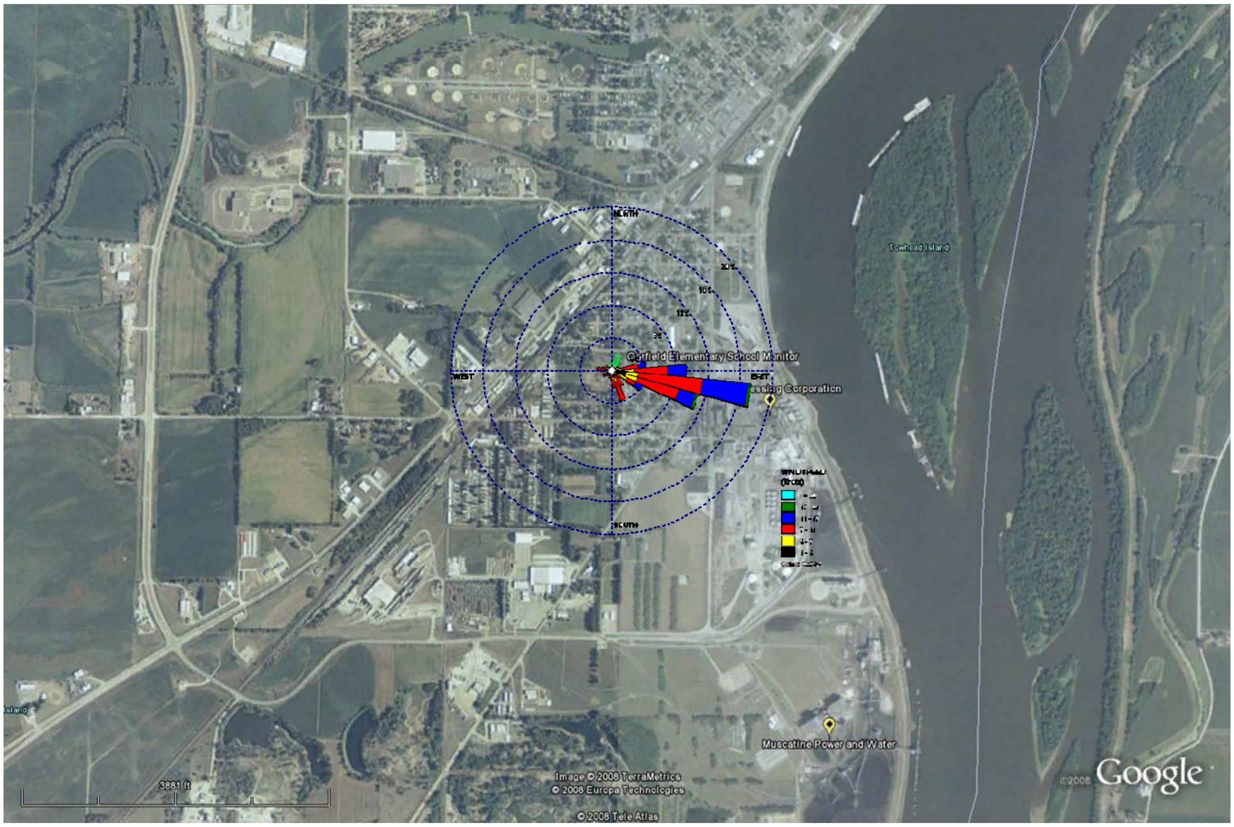

Figure 33. Windrose for exceedances measured at the Garfield school monitor during 2005 -2007.

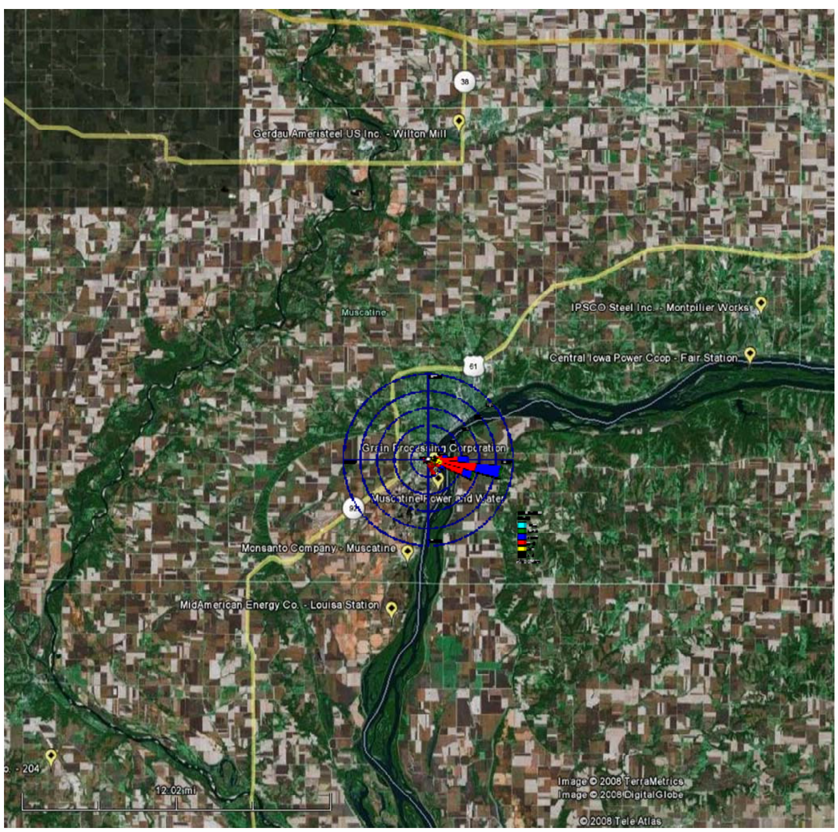

Figure 34. Significant point source locations in Muscatine County in relation to the exceedance windrose. (Note: MidAmerican Energy Co. – Louisa Station is in Louisa County and is an artifact of this plot.)

VII. Summary

The weight of evidence clearly supports sub-county scale boundaries in both Scott and Muscatine counties and convincingly argues for the complete exclusion of Rock Island County. These conclusions are based on the new technical analyses described above and the reevaluation of the information previously generated as part of the nine factor analysis. The sub-county boundaries depicted in Section II include sources that will be important to resolving the air quality issues in the areas of concern, while at the same time protecting the health of individuals in the area where the standard has been violated.

All of the nine factors were considered by IDNR in the determination of the boundaries. Air quality data, emissions inventory information, meteorology, and the modeling analysis results described previously were given the most weight. This approach is justified as the air quality, emissions, and meteorological factors form the basis in developing the conceptual picture of conditions which lead to the violation of the $PM_{2.5}$ standard at both of the violating monitor locations.

Appendix A. Design Value Maps

Design Values are calculated from federal reference method (FRM) data gathered during the period of 2005 to 2007. Design values are as reported from the EPA document, available on line at:

http://www.epa.gov/airtrends/pdfs/final%202005-2007%20PM2.5%20design%20values%20AQS%2008jul08.xls

Only sites with complete data or complete data after substitution (“A” and “NA”) are included.

The data used for exceedance days at Blackhawk Foundry and exceedance days at Garfield School were retrieved from EPA’s Air Quality System (AQS) in October 2008.

Concentrations and Design Values are expressed in micrograms per cubic ($\mu g/m^3$).

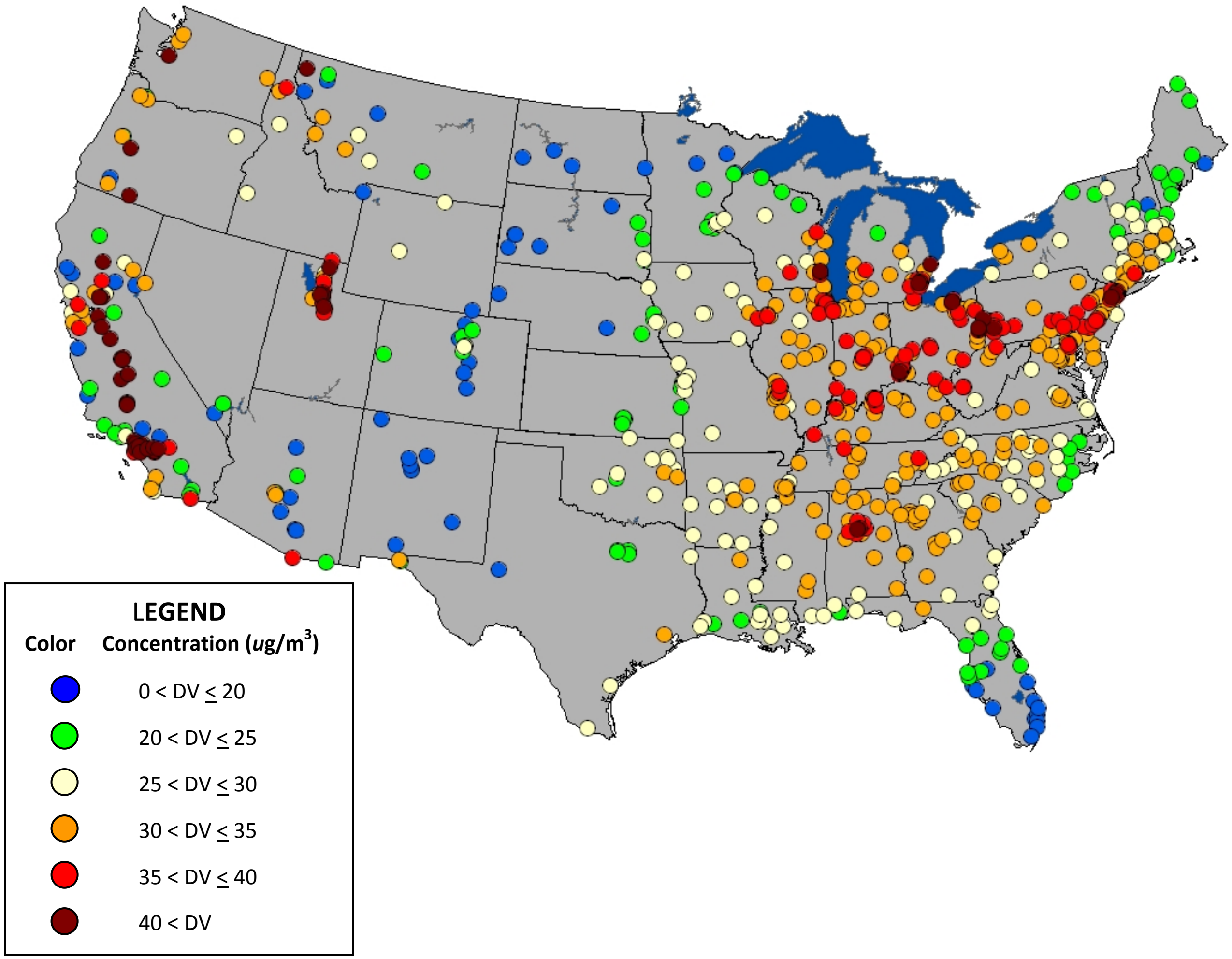

Figure 1. $PM_{2.5}$ 24 hour design values for the period 2005-2007. Sites with complete data or complete data after substitution are shown. Large cities may have multiple monitors that are obscured at this resolution.

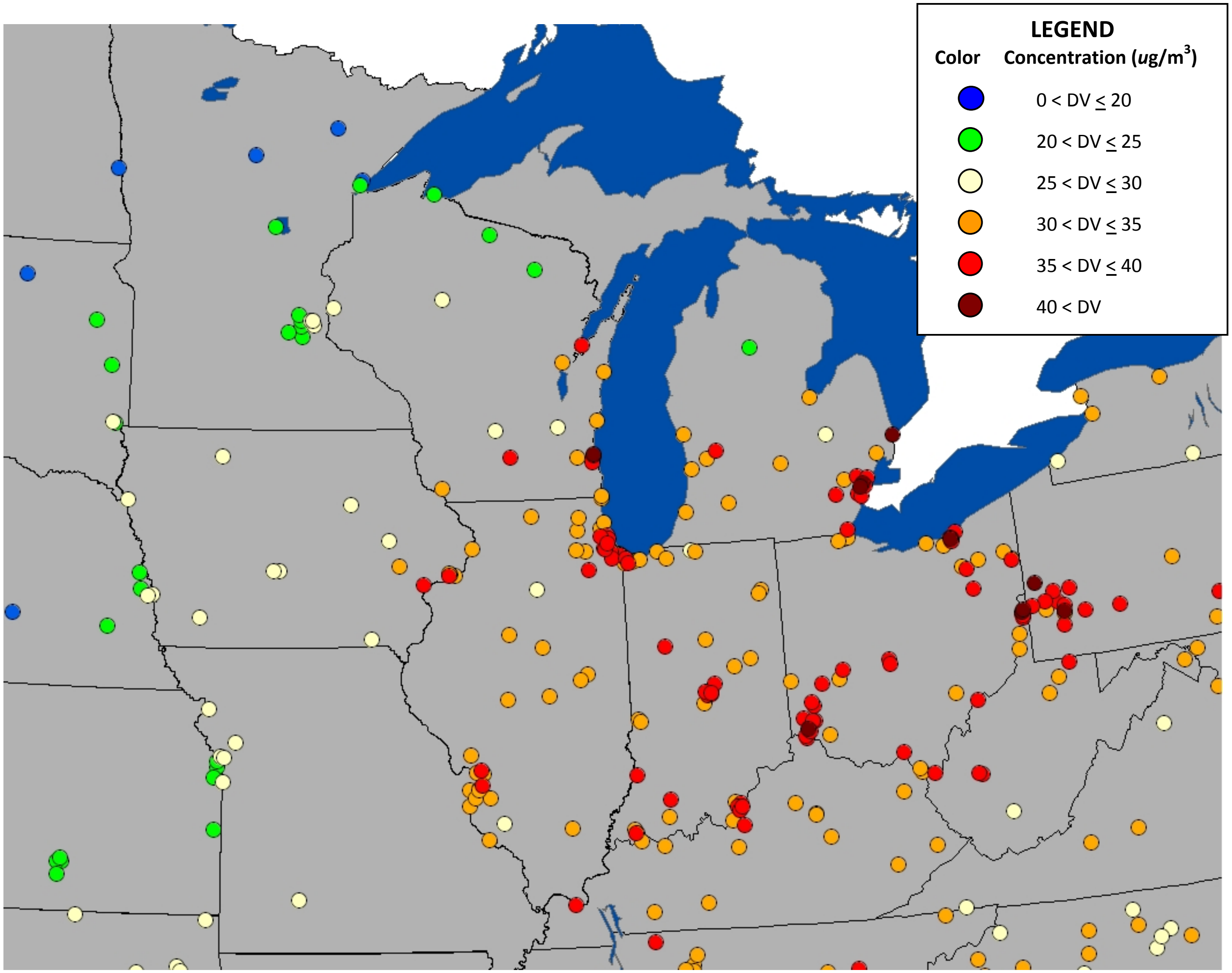

Figure 2. $PM_{2.5}$ 24 hr Design Values 2005-2007 for the Western Great Plains and Midwest. Sites with complete data or complete data after substitution are shown. Large cities may have multiple monitors that are obscured at this resolution.

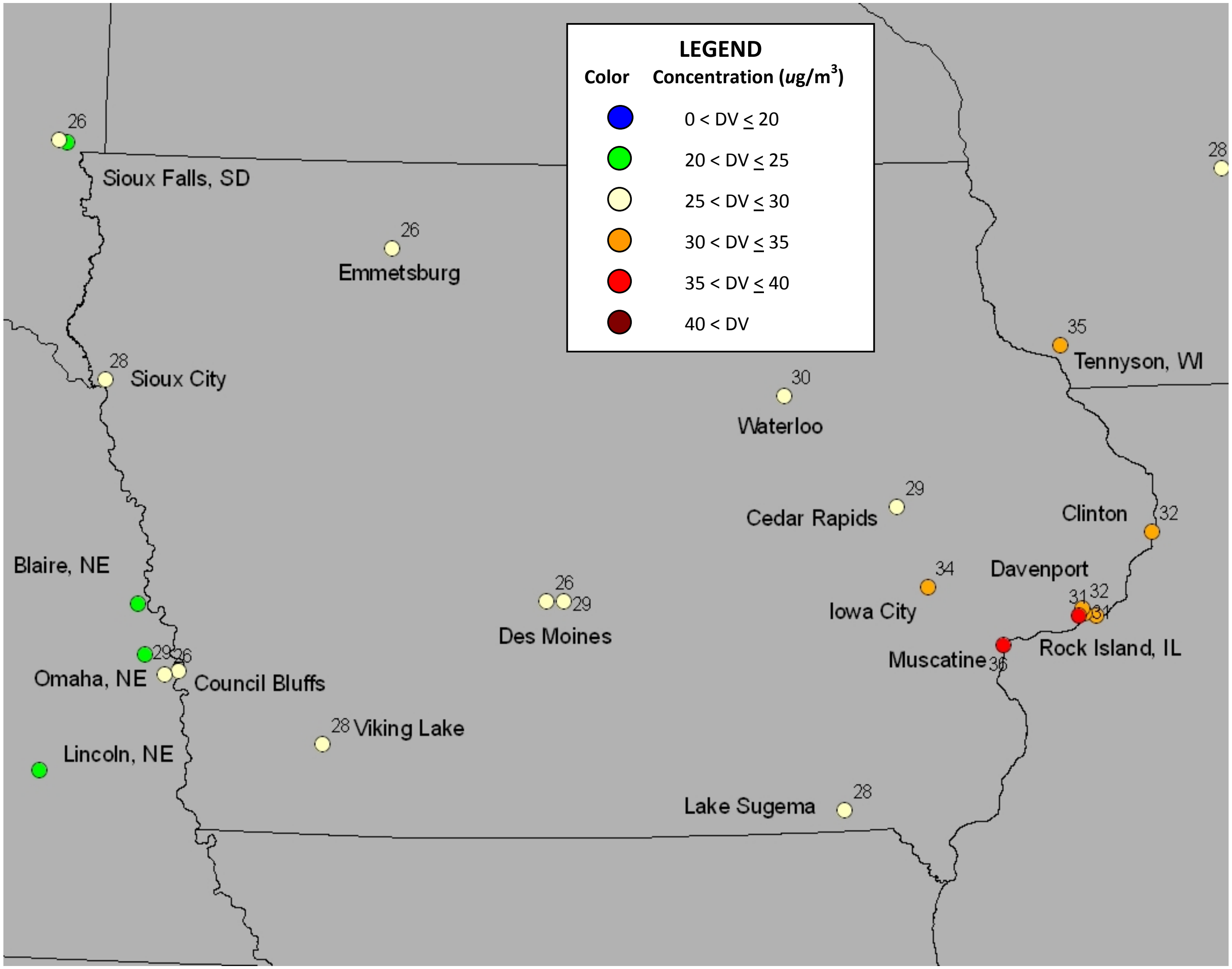

Figure 3. $PM_{2.5}$ Design Values 2005-2007 for Iowa and Border Monitoring Locations. Sites with complete data or complete data after substitution are shown.

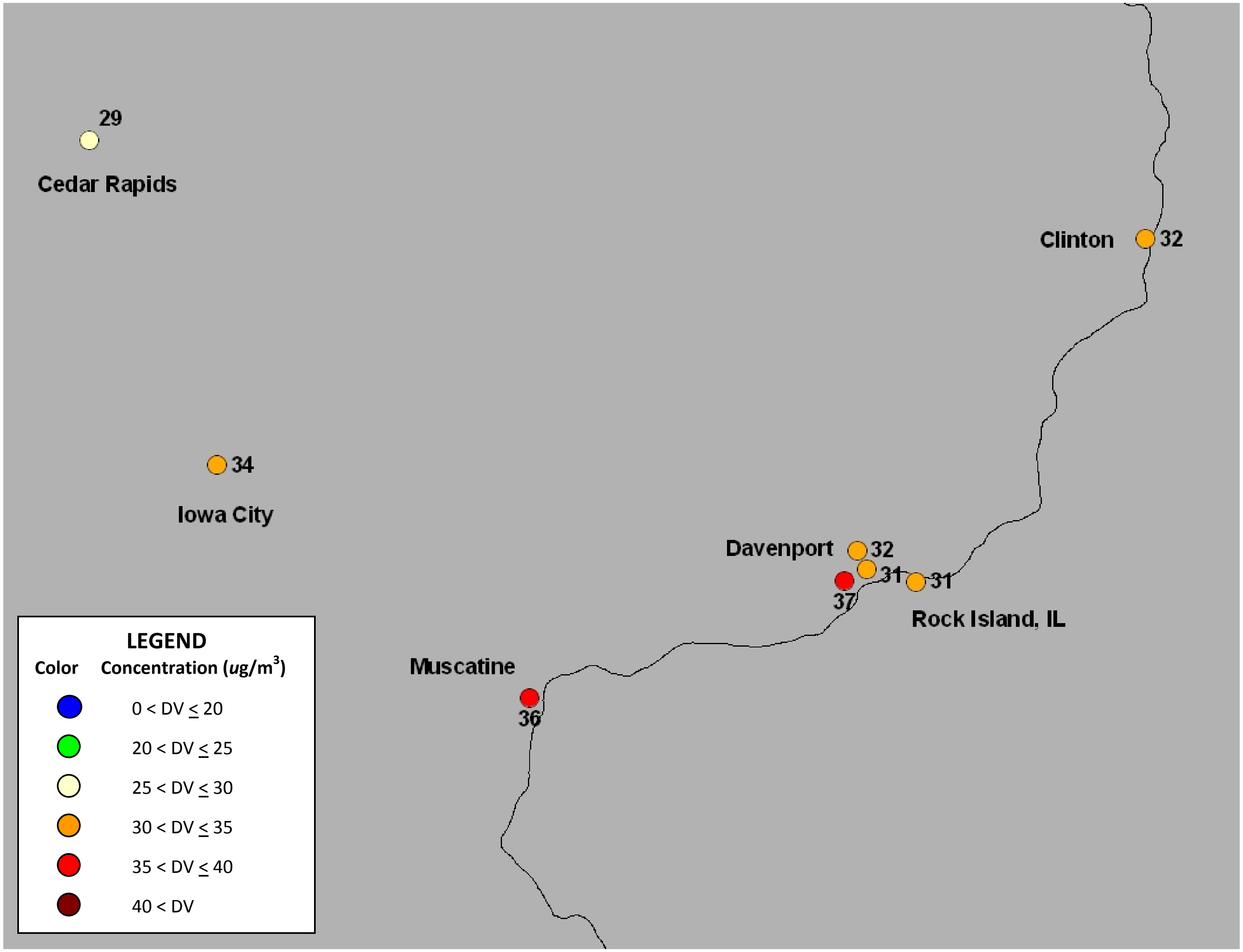

Figure 4. $PM_{2.5}$ Design Values 2005-2007 for Davenport, Iowa and Surrounding Locations. Sites with complete data or complete data after substitution are shown.

Appendix B. Regional Maps of $PM_{2.5}$ Concentrations for Exceedance Days at the Blackhawk Foundry Monitor

Design Values are calculated from federal reference method (FRM) data gathered during the period of 2005 to 2007. Design values are as reported from the EPA document, available on line at:

http://www.epa.gov/airtrends/pdfs/final%202005-2007%20PM2.5%20design%20values%20AQS%2008jul08.xls

Only sites with complete data or complete data after substitution ("A" and "NA") are included.

The data used for exceedance days at Blackhawk Foundry and exceedance days at Garfield School were retrieved from EPA's Air Quality System (AQS) in October 2008.

Concentrations and Design Values are expressed in micrograms per cubic ($\mu g/m^3$)

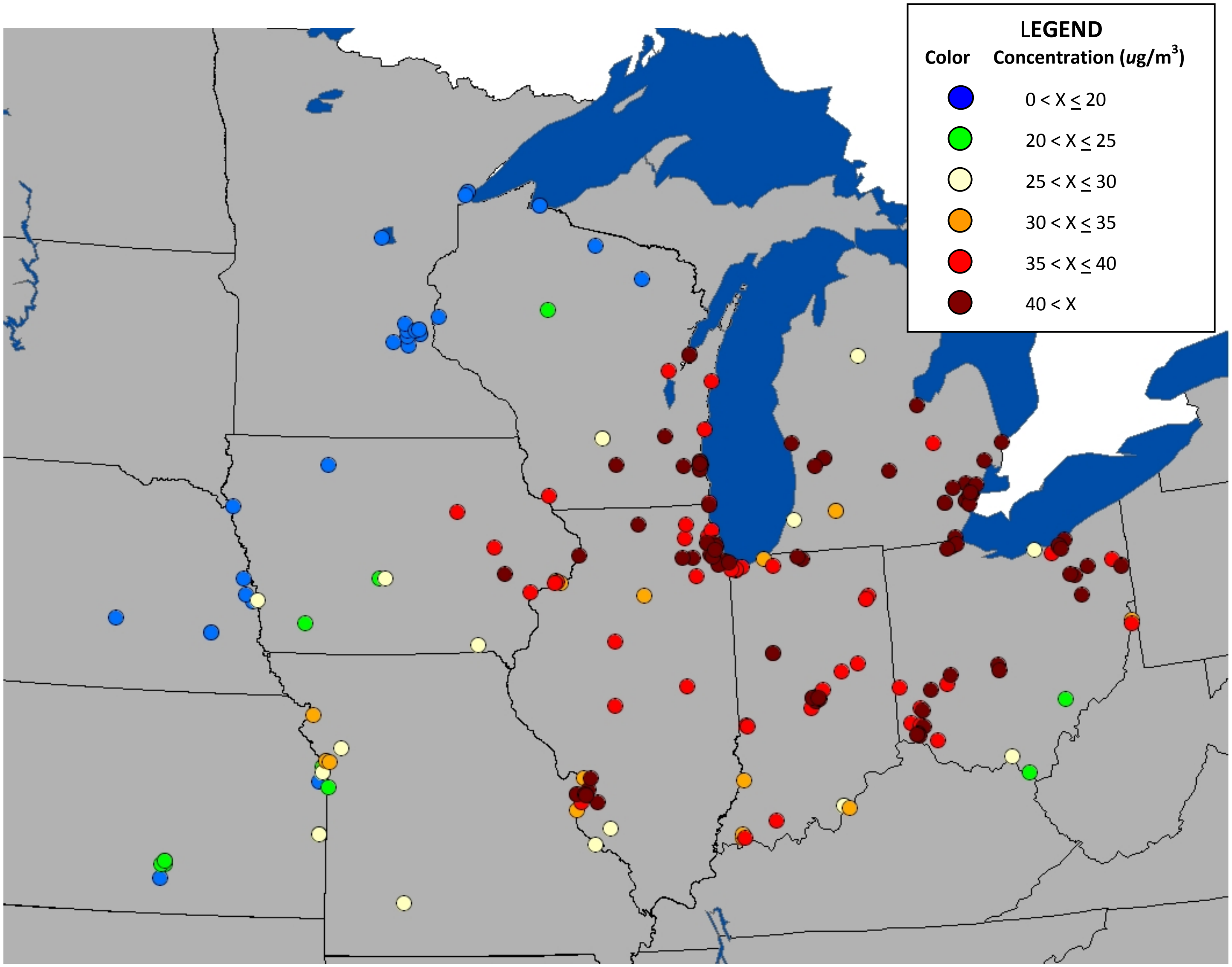

Figure 1 February 3, 2005.

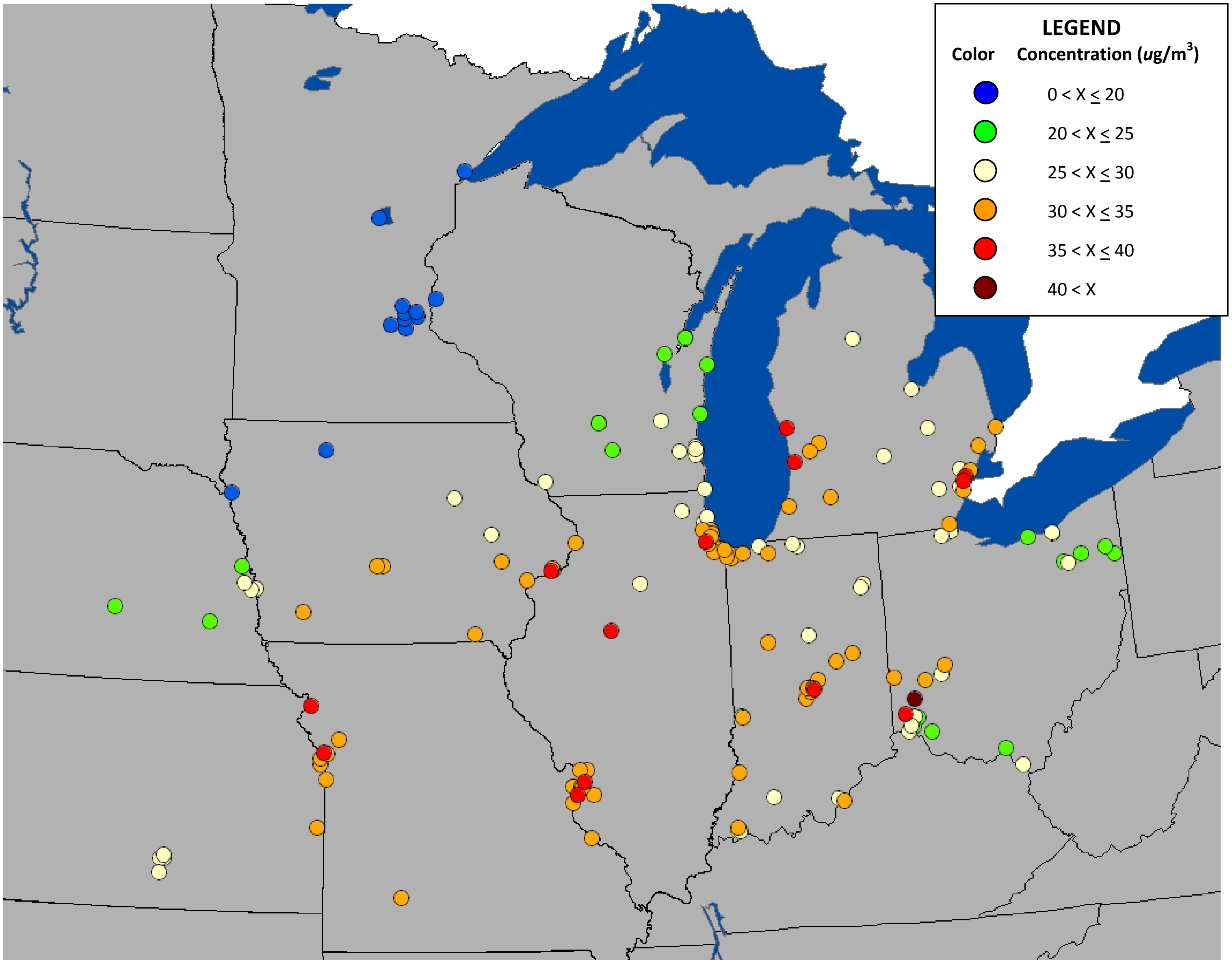

Figure 2. June 24, 2005.

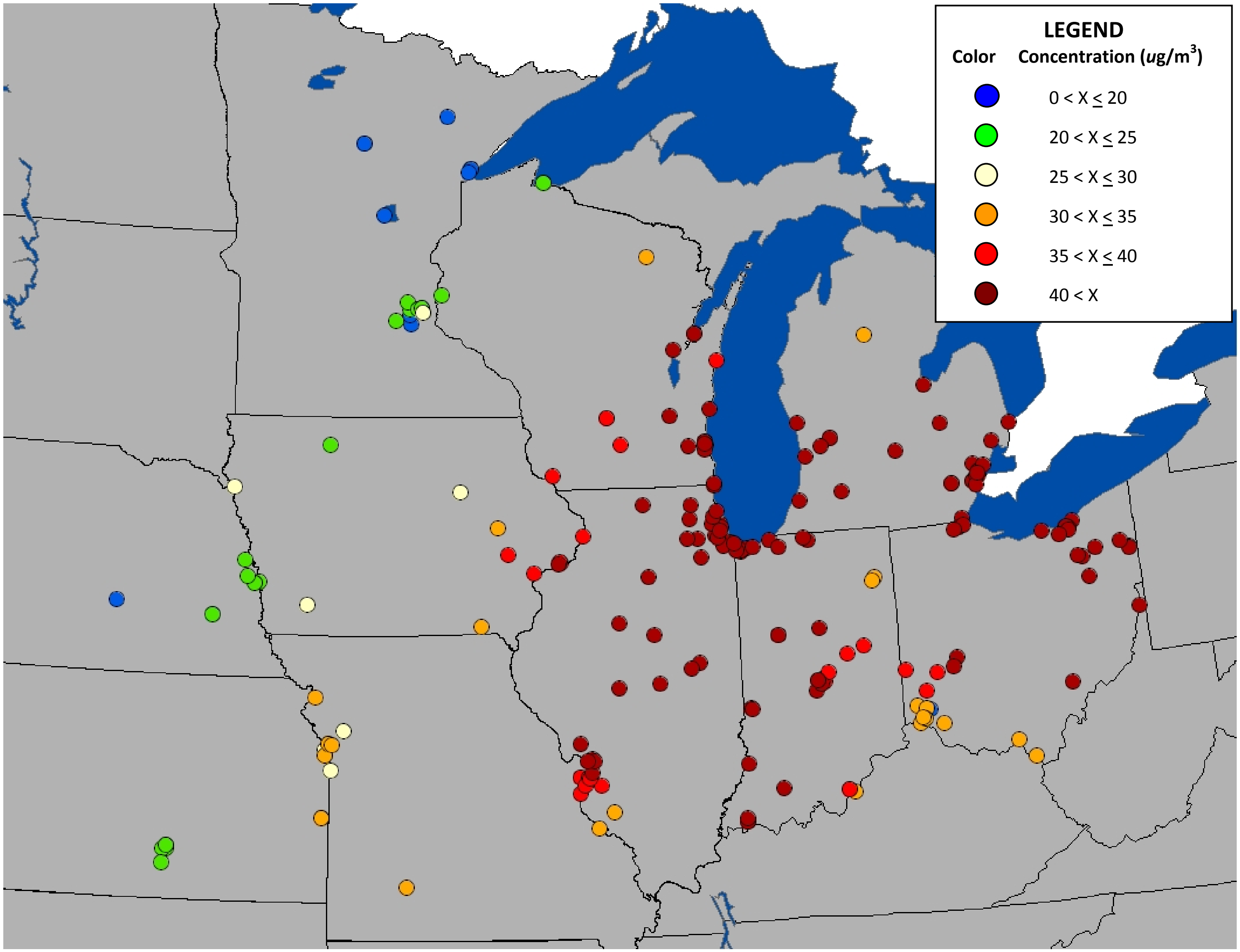

Figure 3. June 27, 2005.

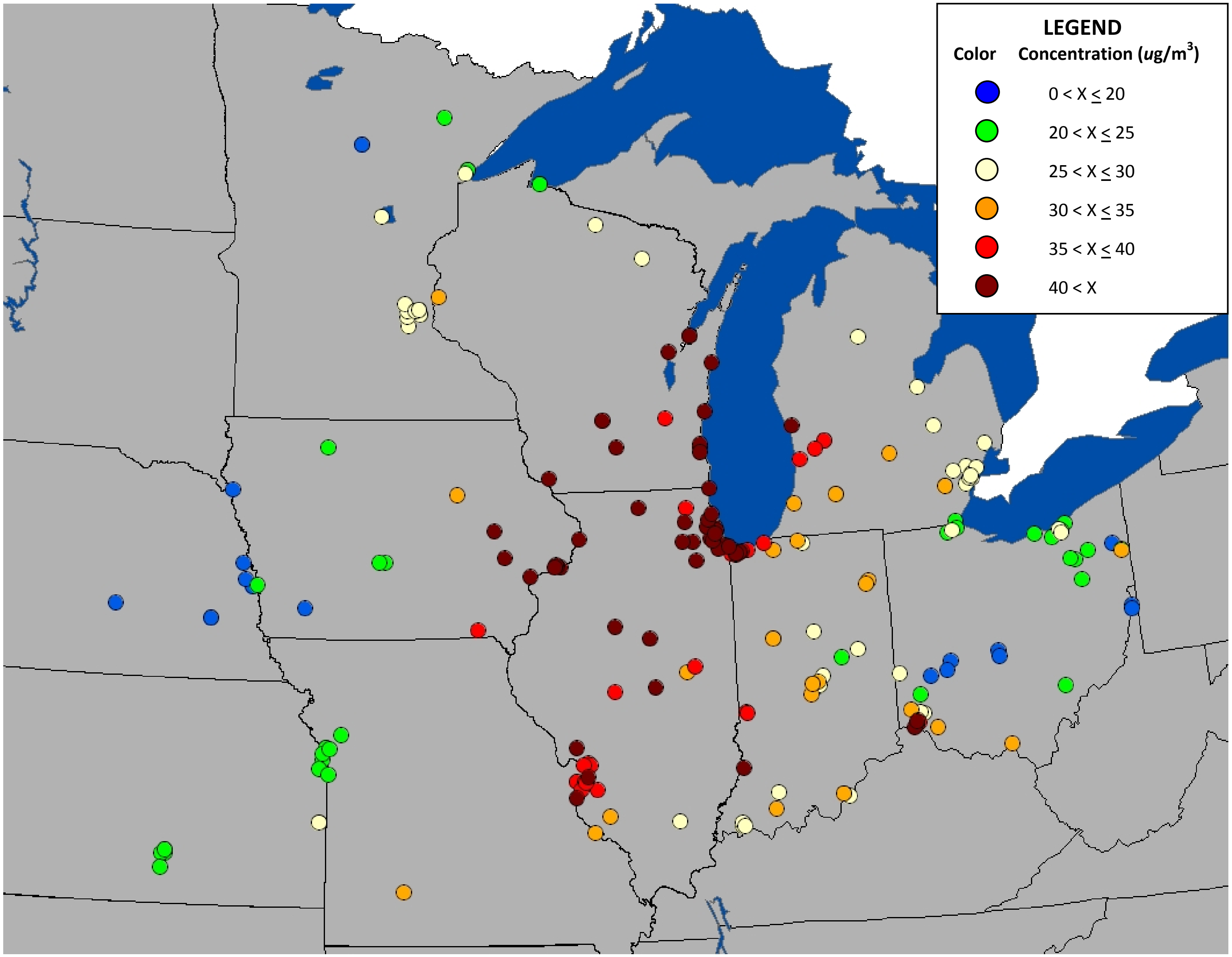

Figure 4. August 2, 2005.

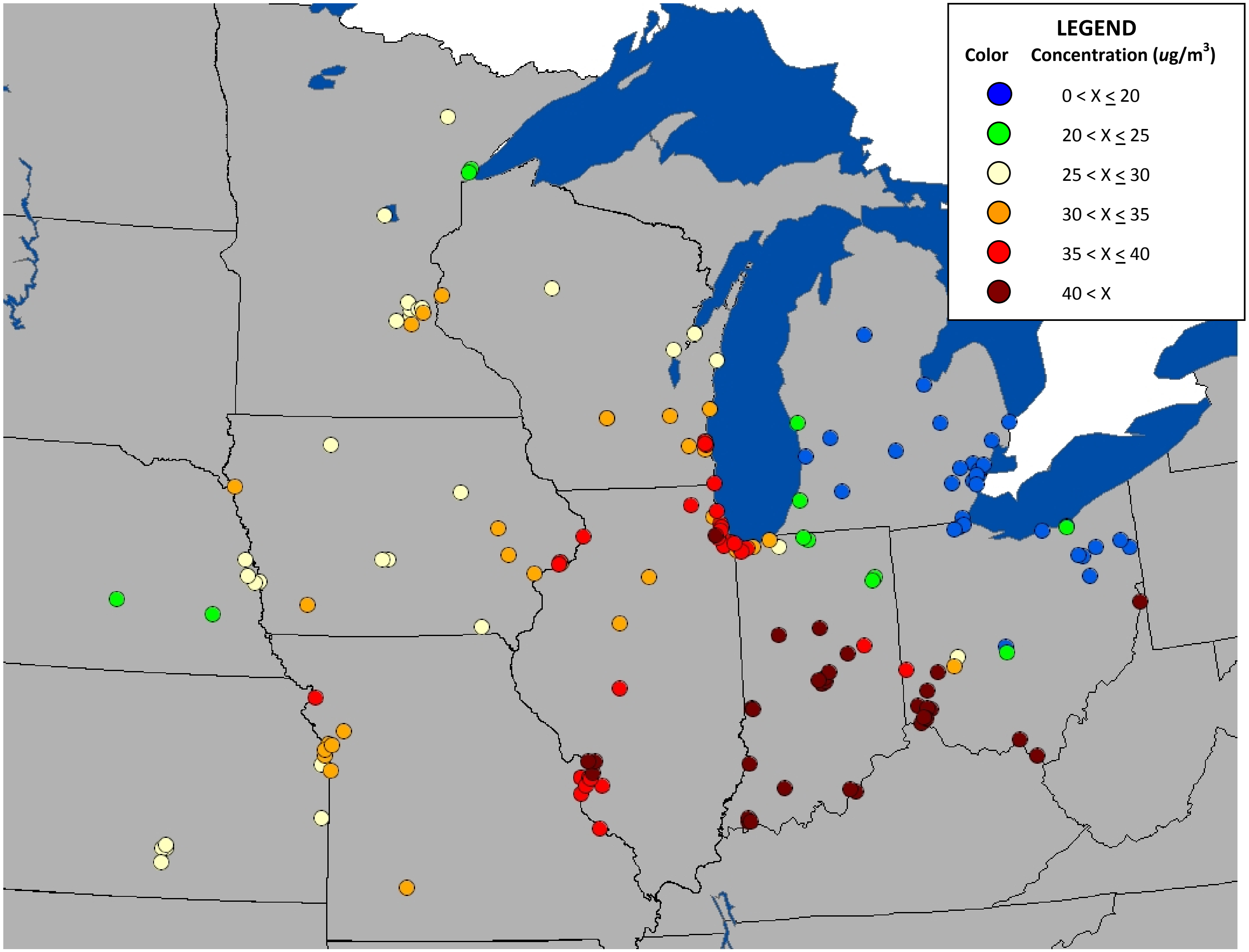

Figure 5. September 10, 2005.

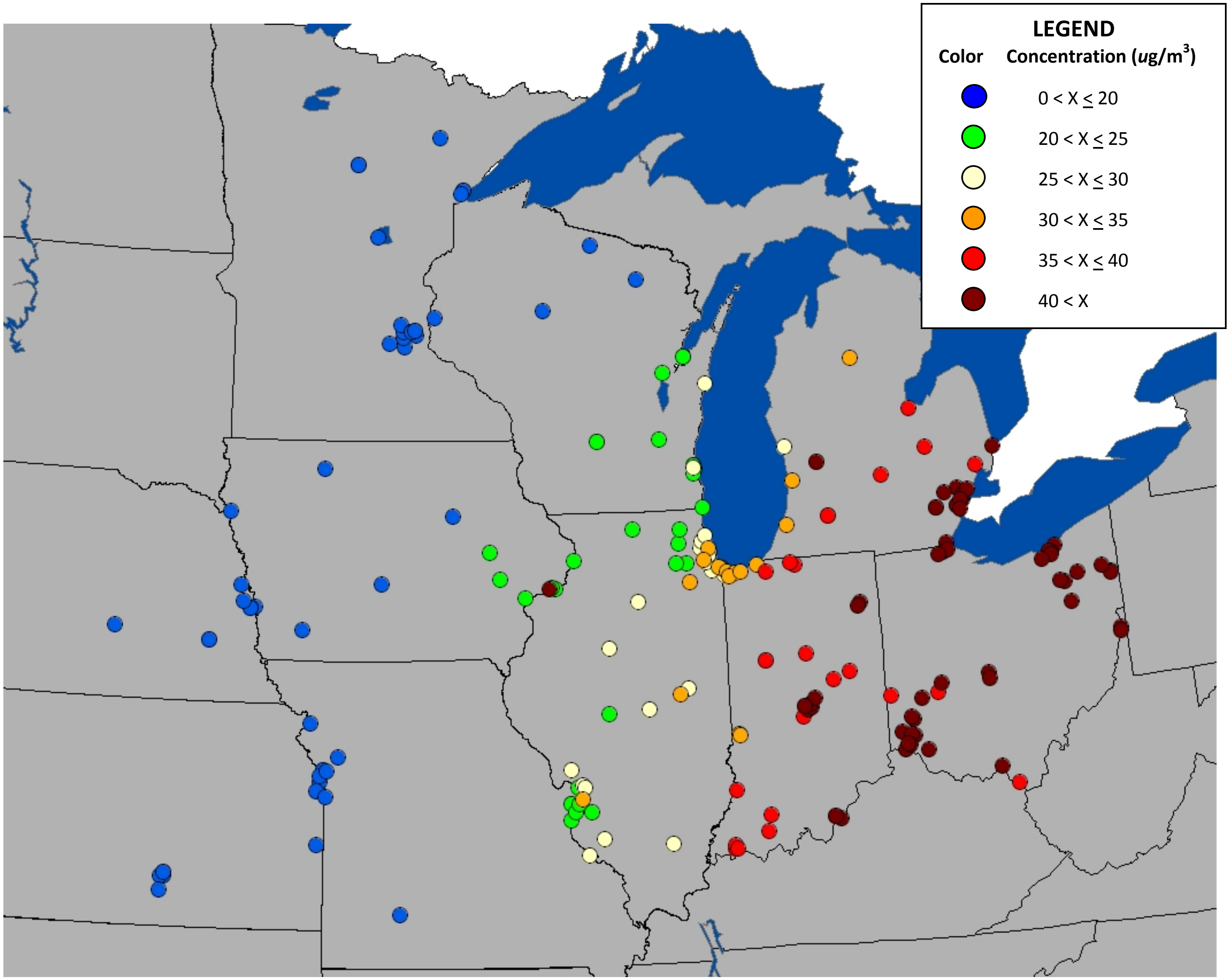

Figure 6. September 13, 2005.

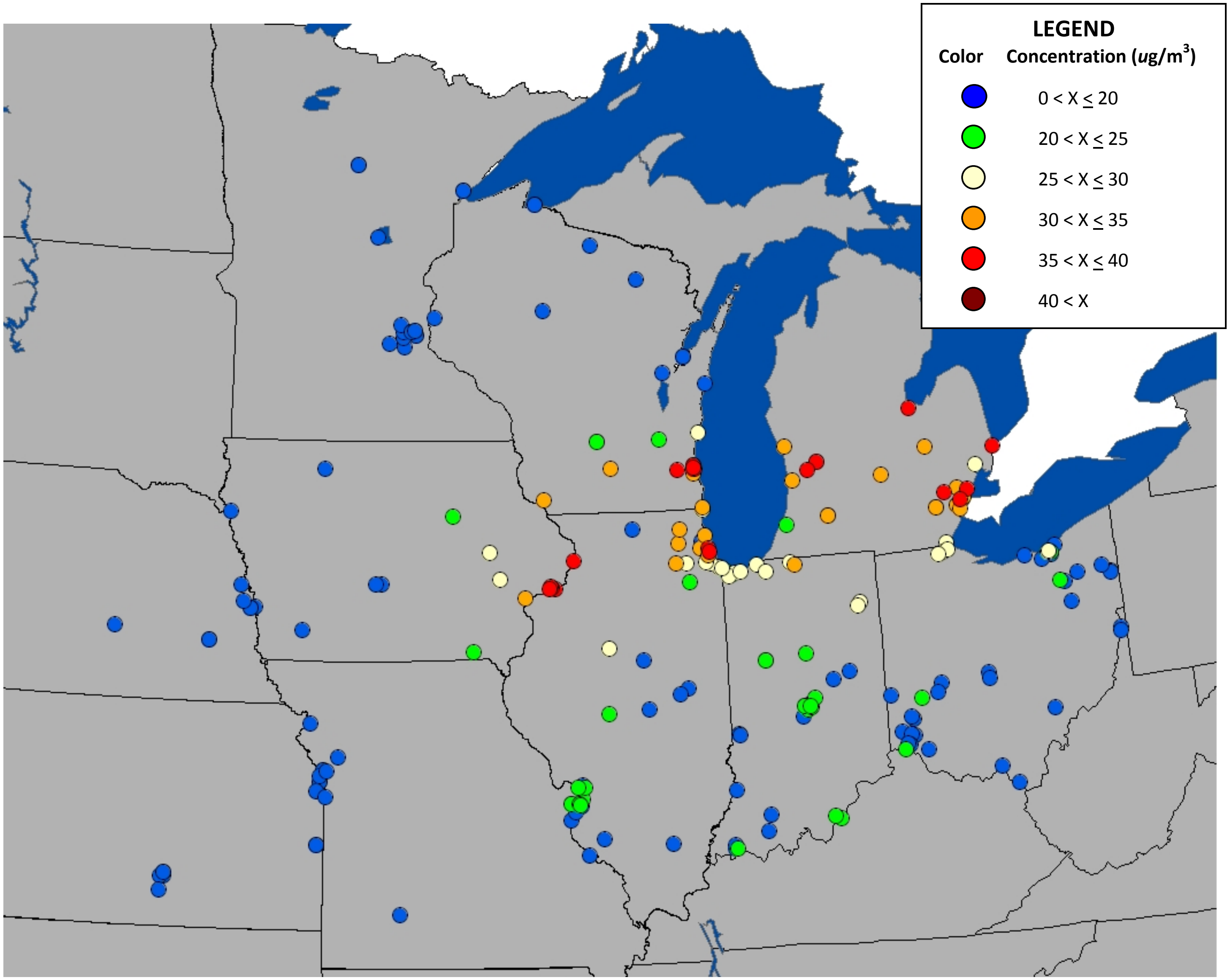

Figure 7. December 24, 2005.

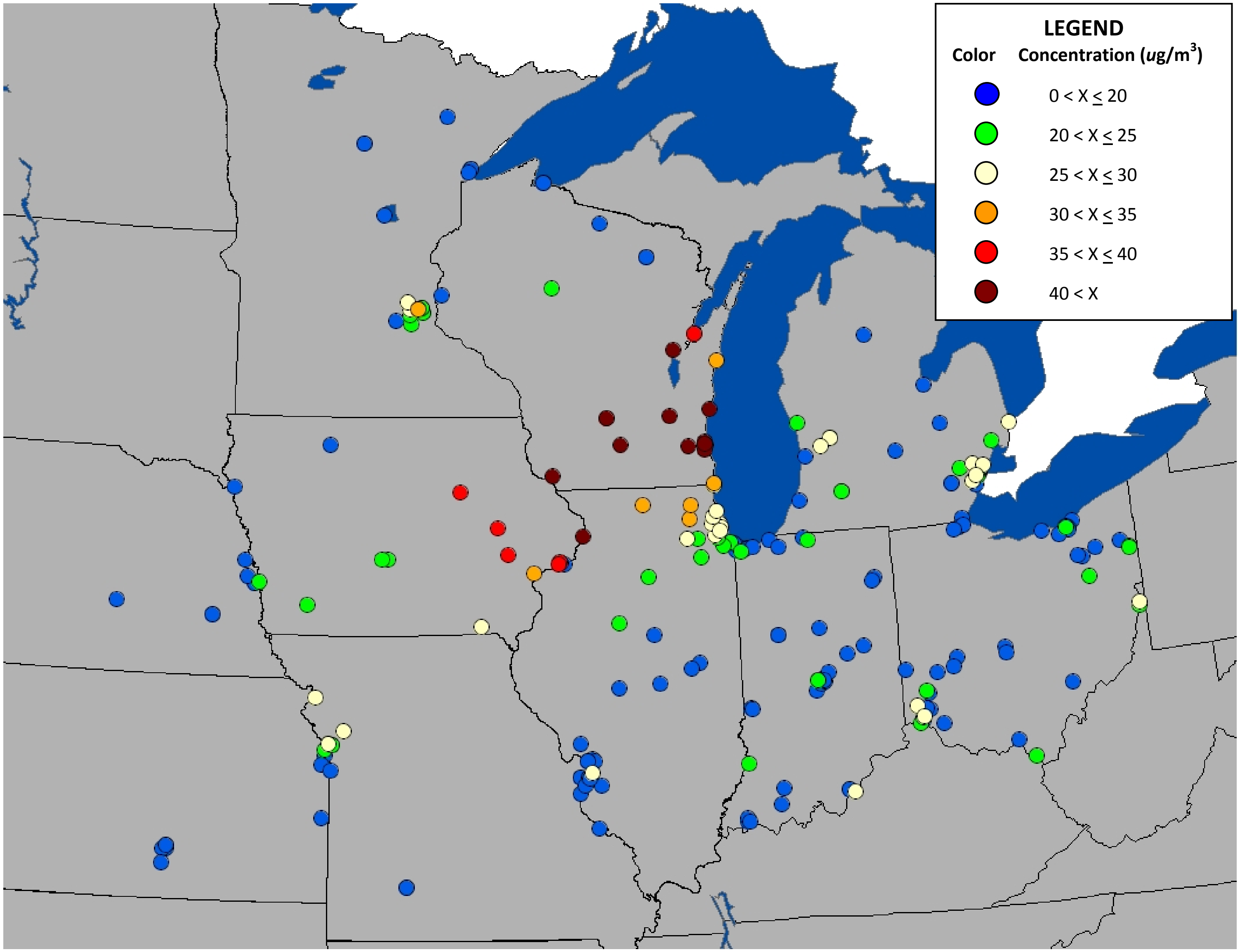

Figure 8. November 25, 2006.

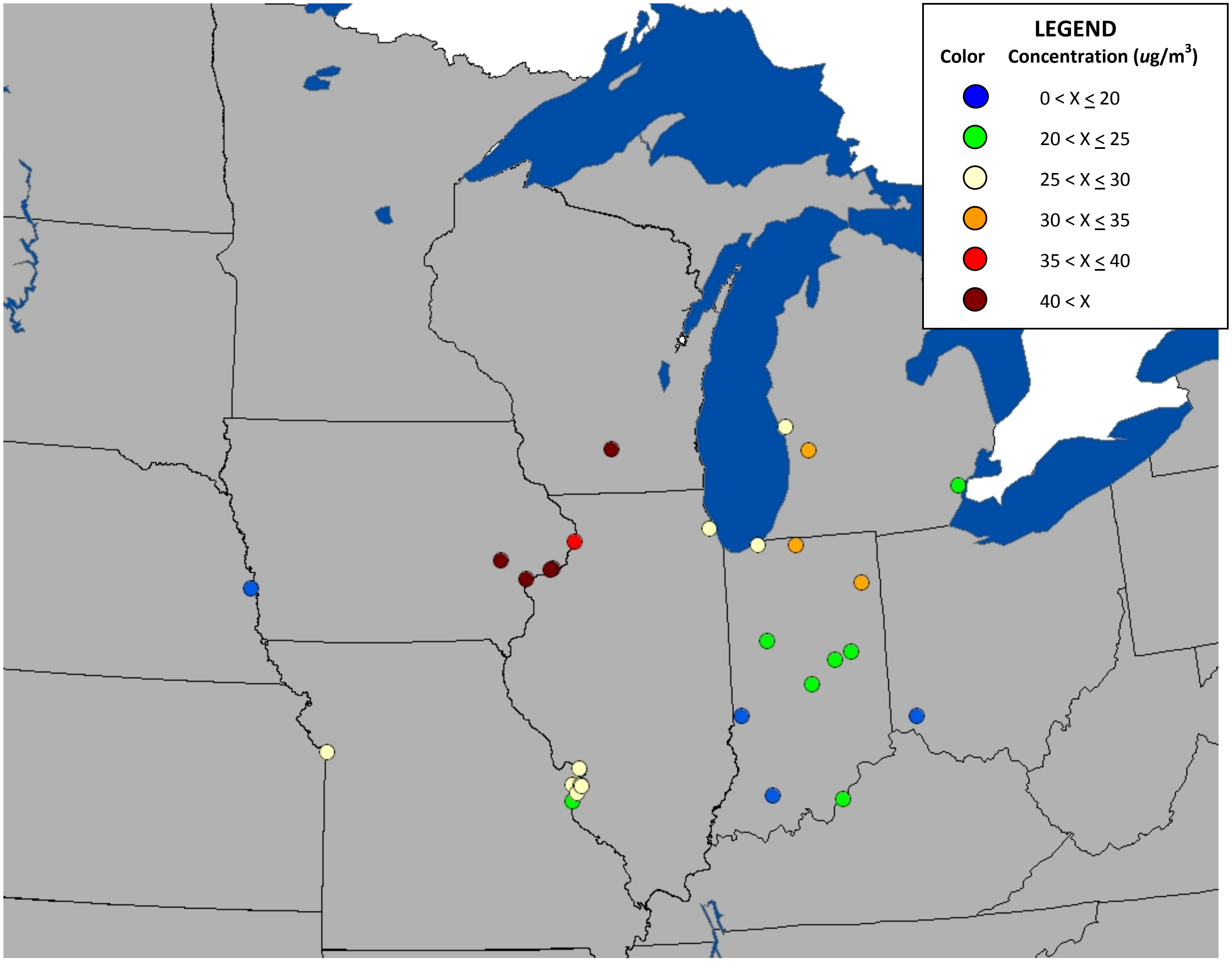

Figure 9. March 9, 2007.

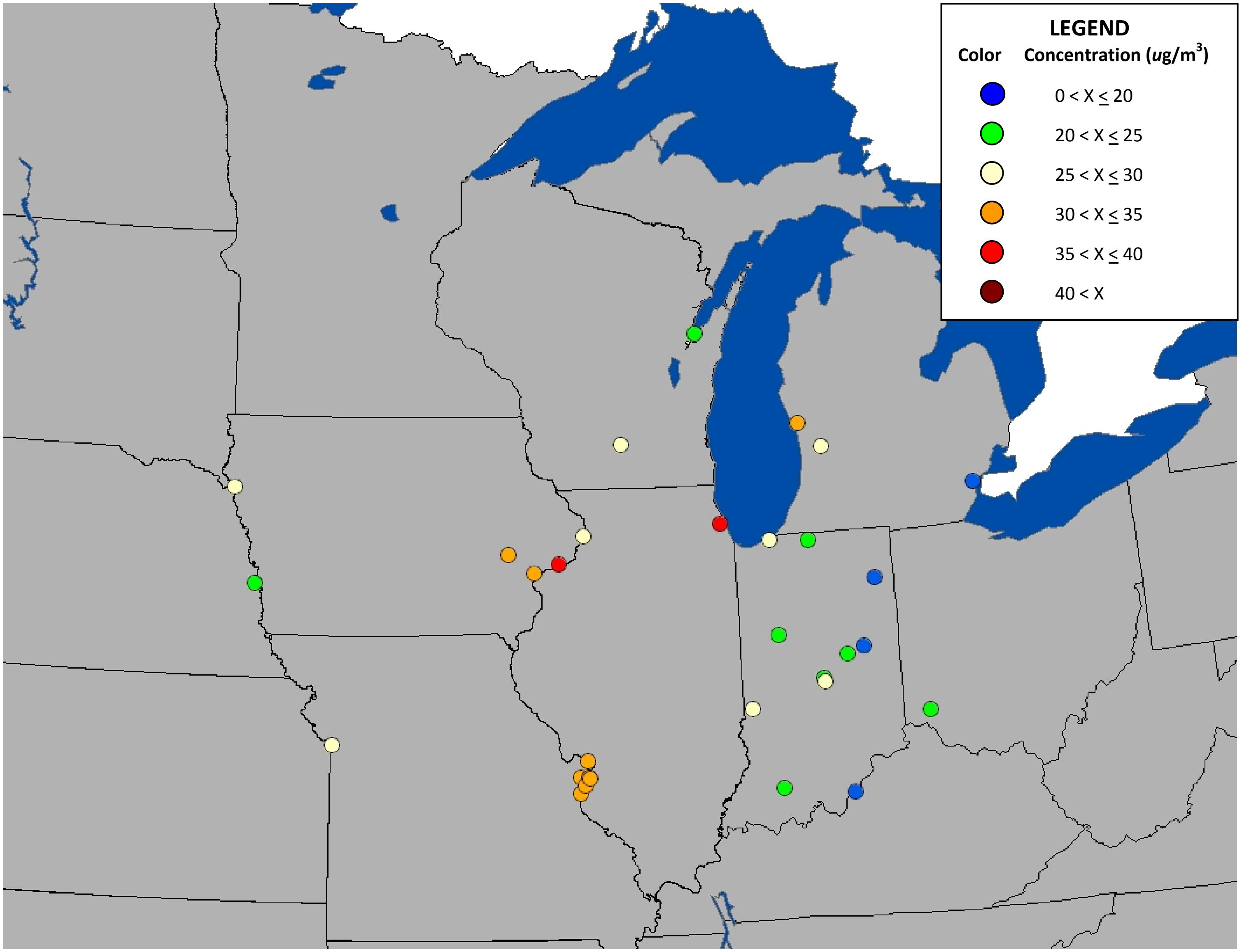

Figure 10. June 16, 2007.

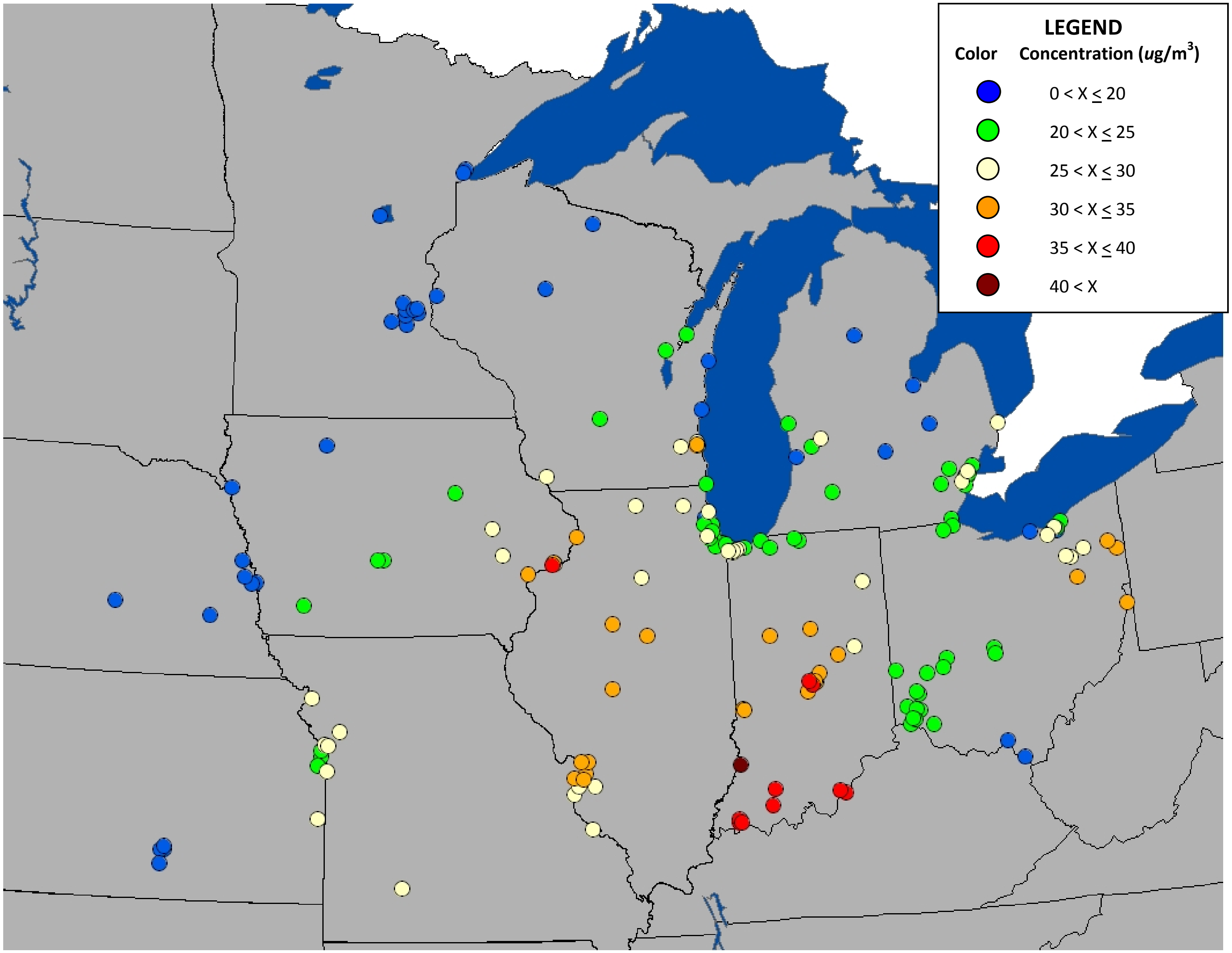

Figure 11. July 26, 2007.

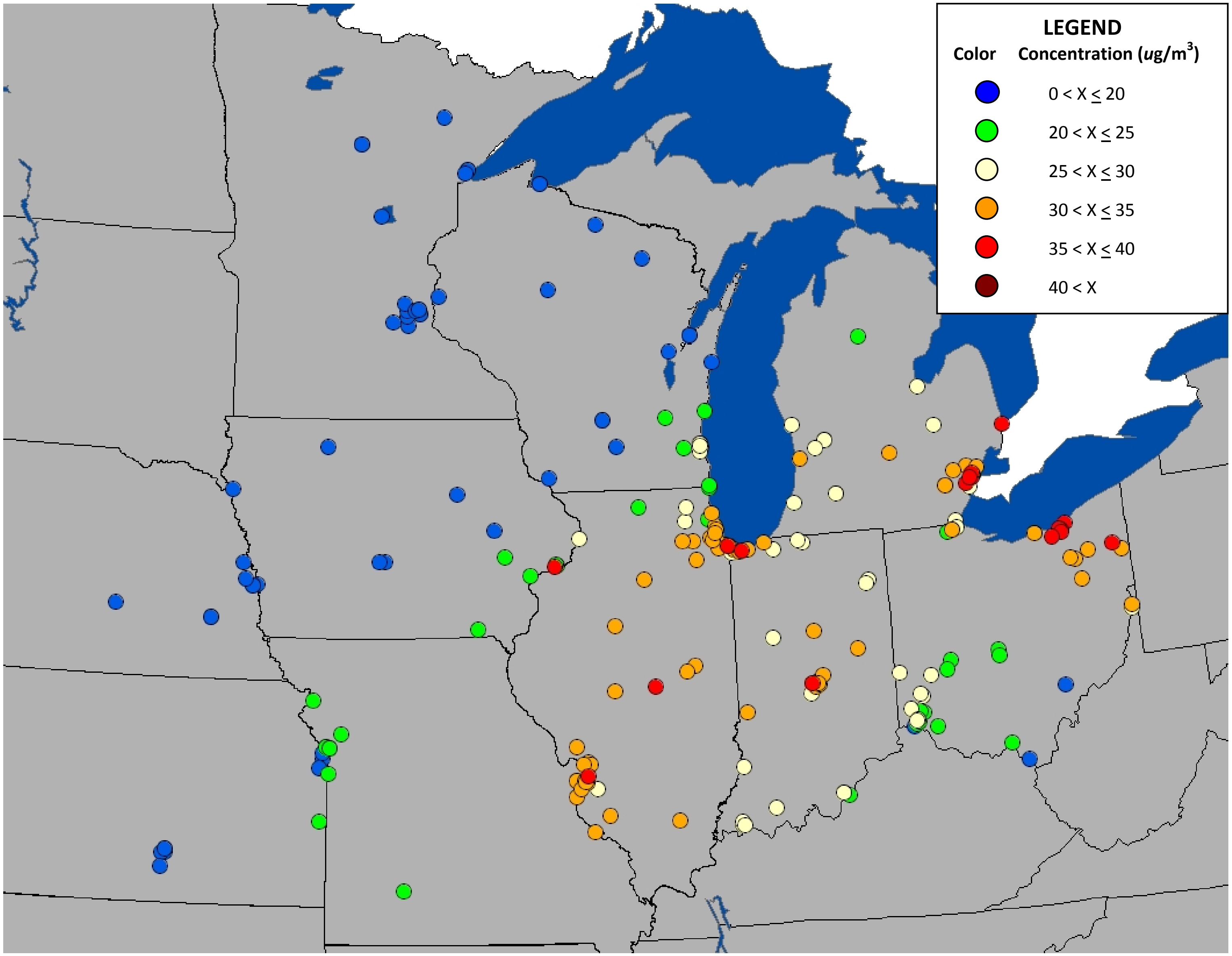

Figure 12. September 21, 2007.

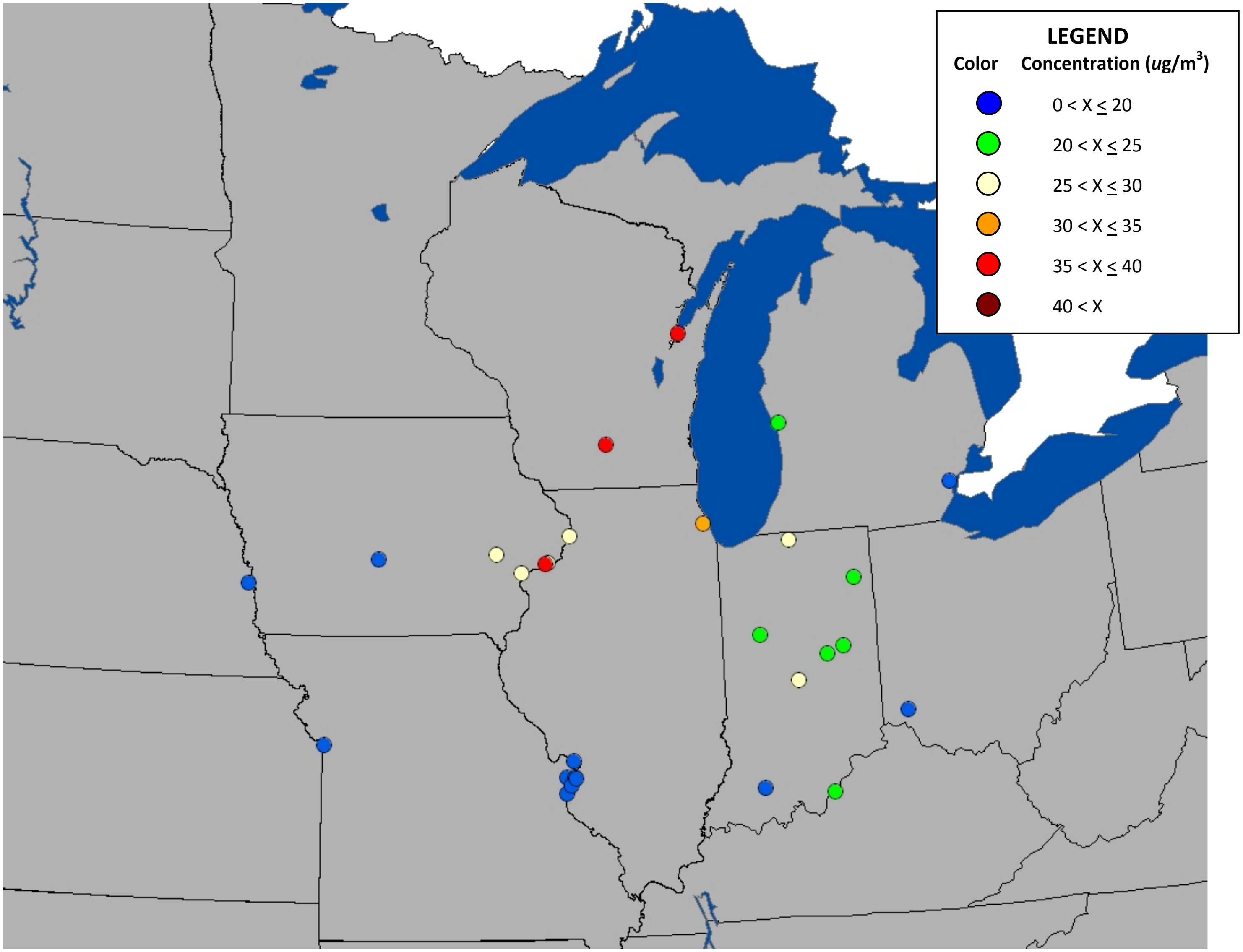

Figure 13. November 19, 2007.

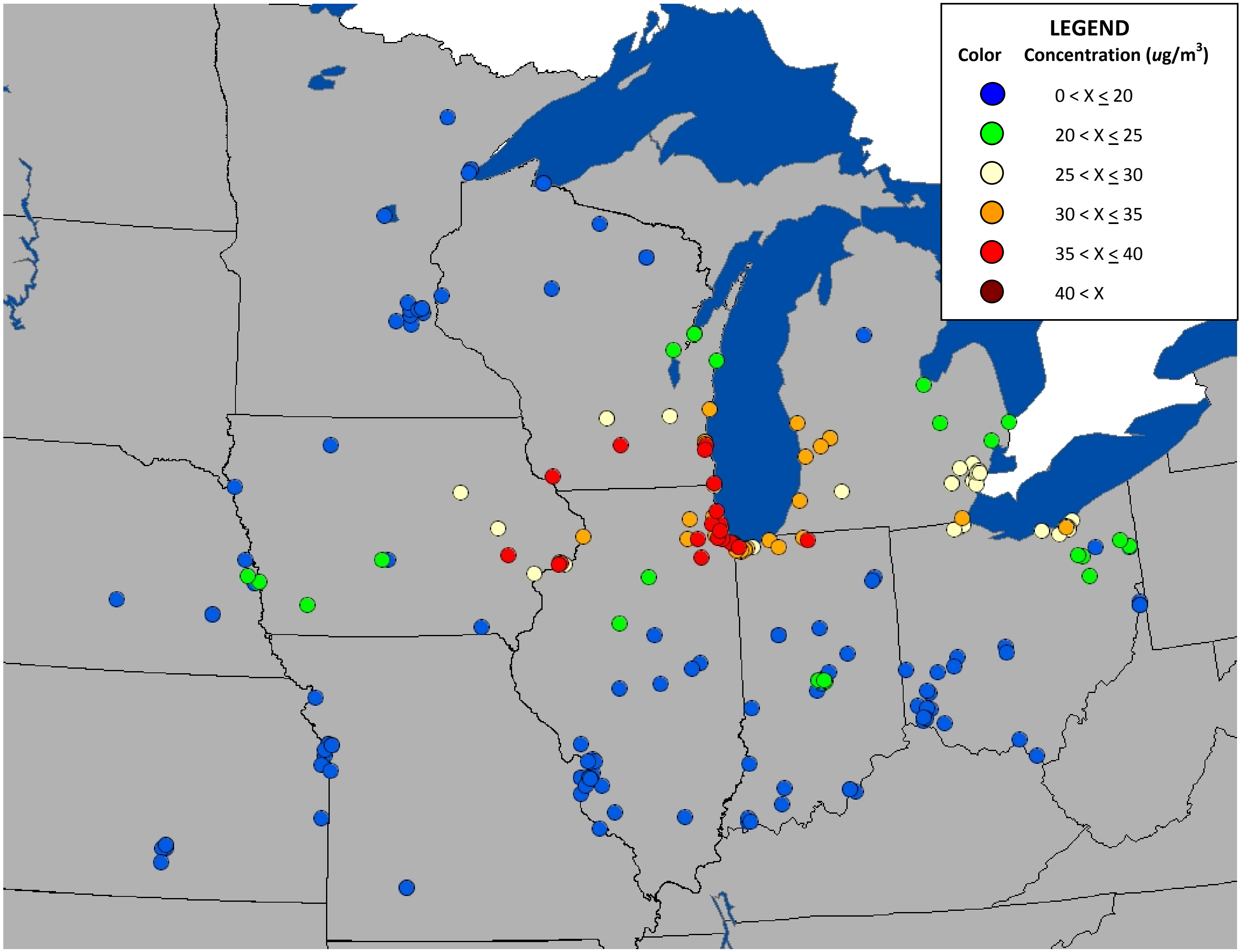

Figure 14. November 20, 2007.

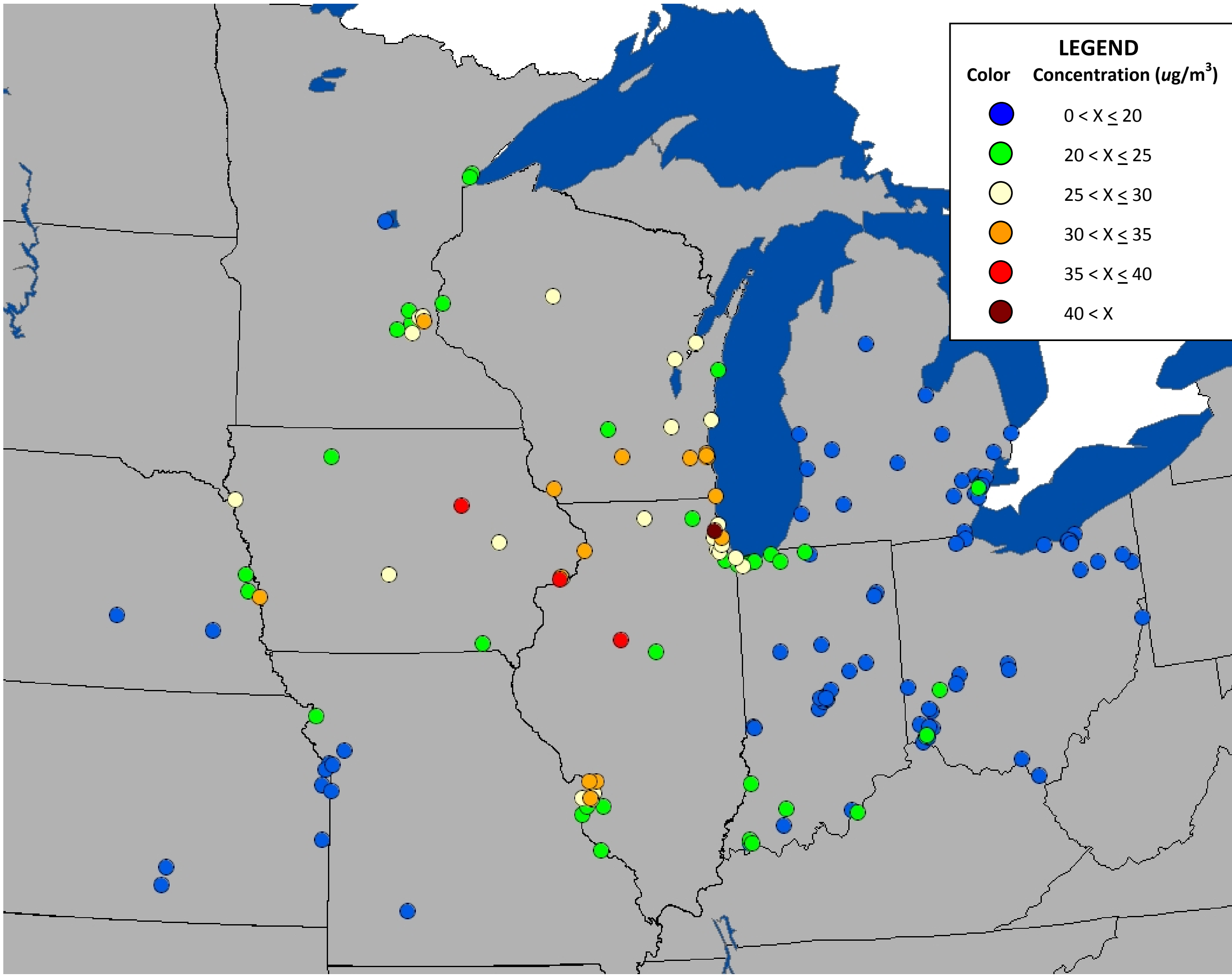

Figure 15. December 17, 2007.

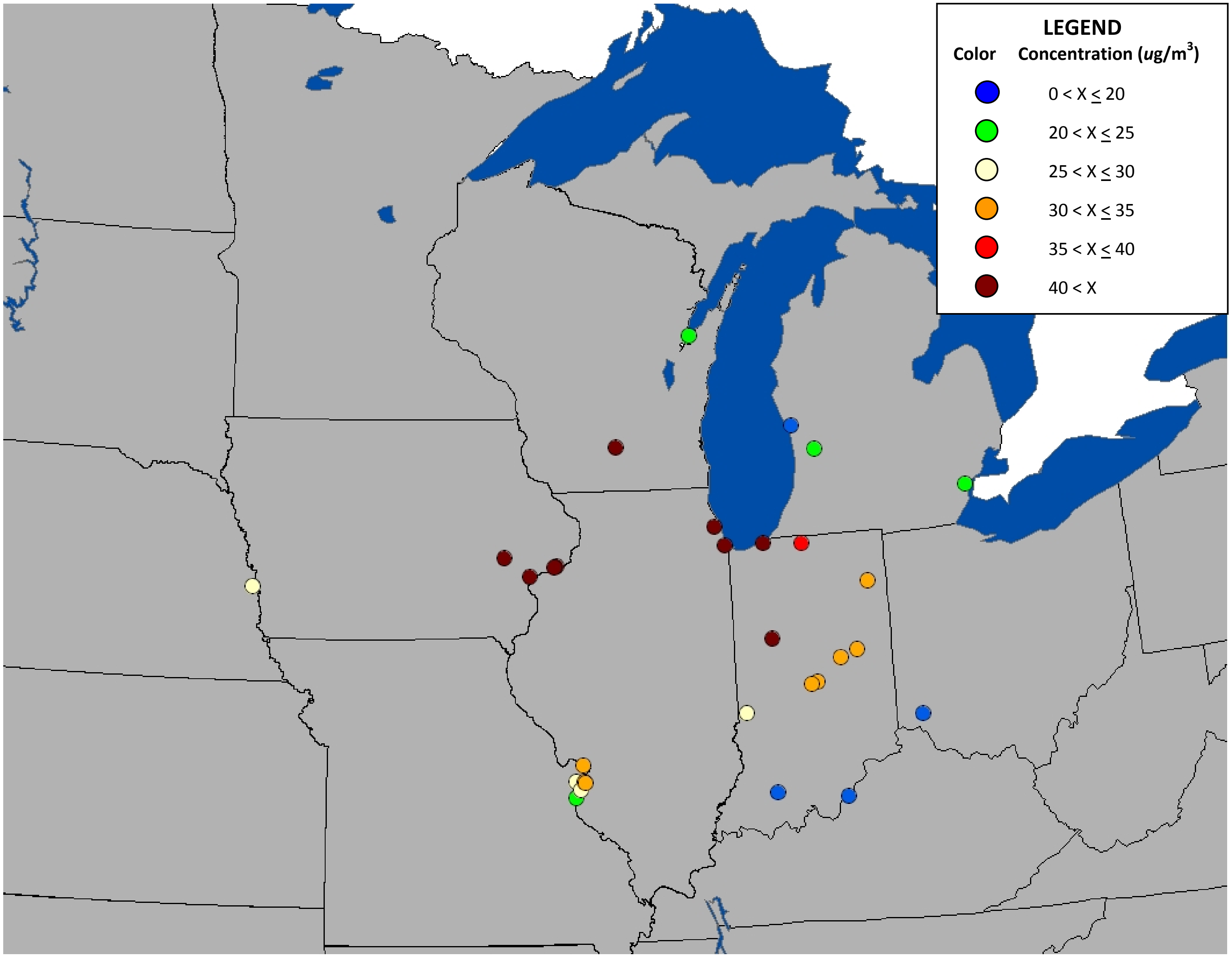

Figure 16. December 19, 2007.

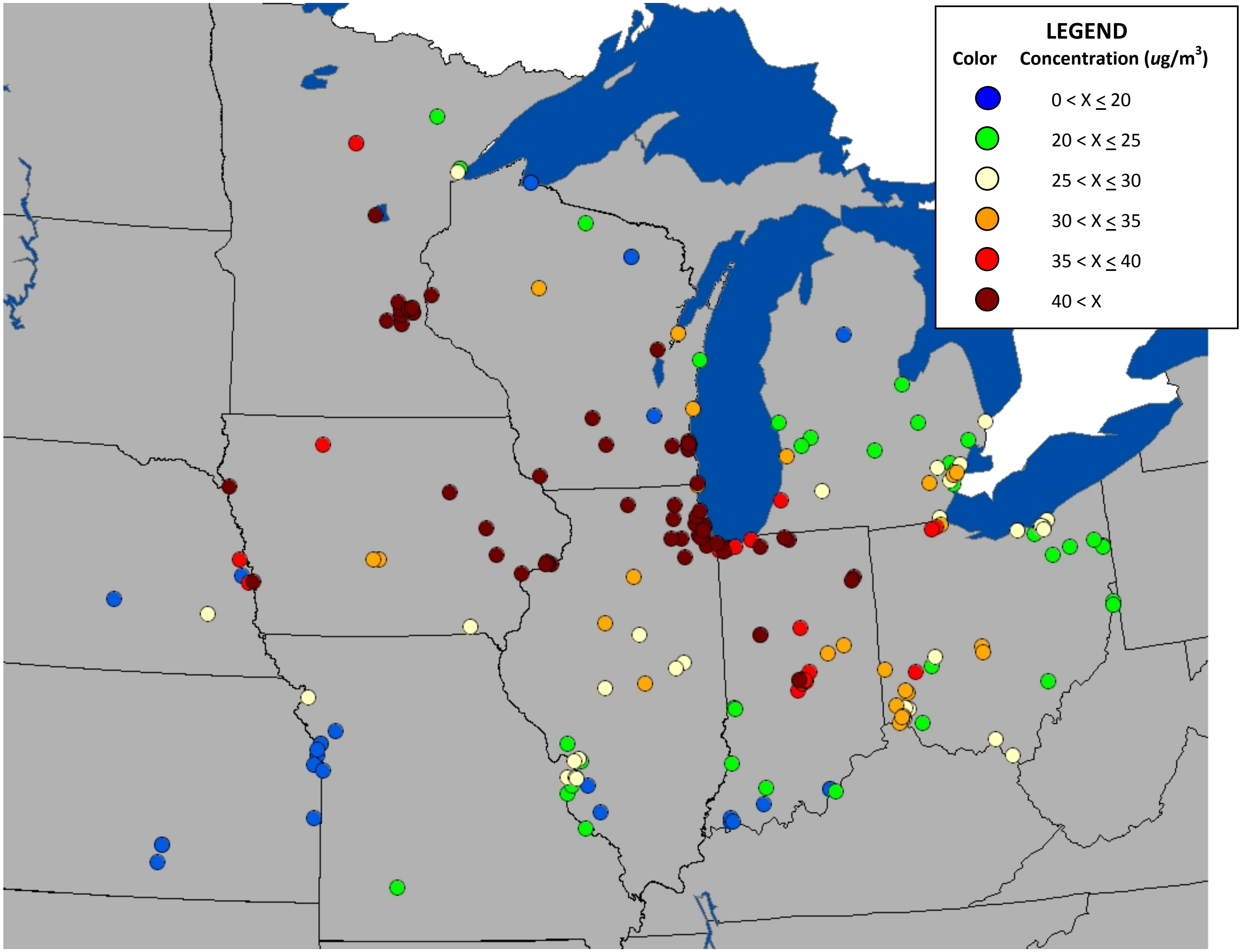

Figure 17. December 20, 2007.

Appendix C. Regional Maps of $PM_{2.5}$ Concentrations for Exceedance Days at the Garfield School Monitor

Design Values are calculated from federal reference method (FRM) data gathered during the period of 2005 to 2007. Design values are as reported from the EPA document, available on line at:

http://www.epa.gov/airtrends/pdfs/final%202005-2007%20PM2.5%20design%20values%20AQS%2008jul08.xls

Only sites with complete data or complete data after substitution ("A" and "NA") are included.

The data used for exceedance days at Blackhawk Foundry and exceedance days at Garfield School were retrieved from EPA's Air Quality System (AQS) in October 2008.

Concentrations and Design Values are expressed in micrograms per cubic ($\mu g/m^3$).

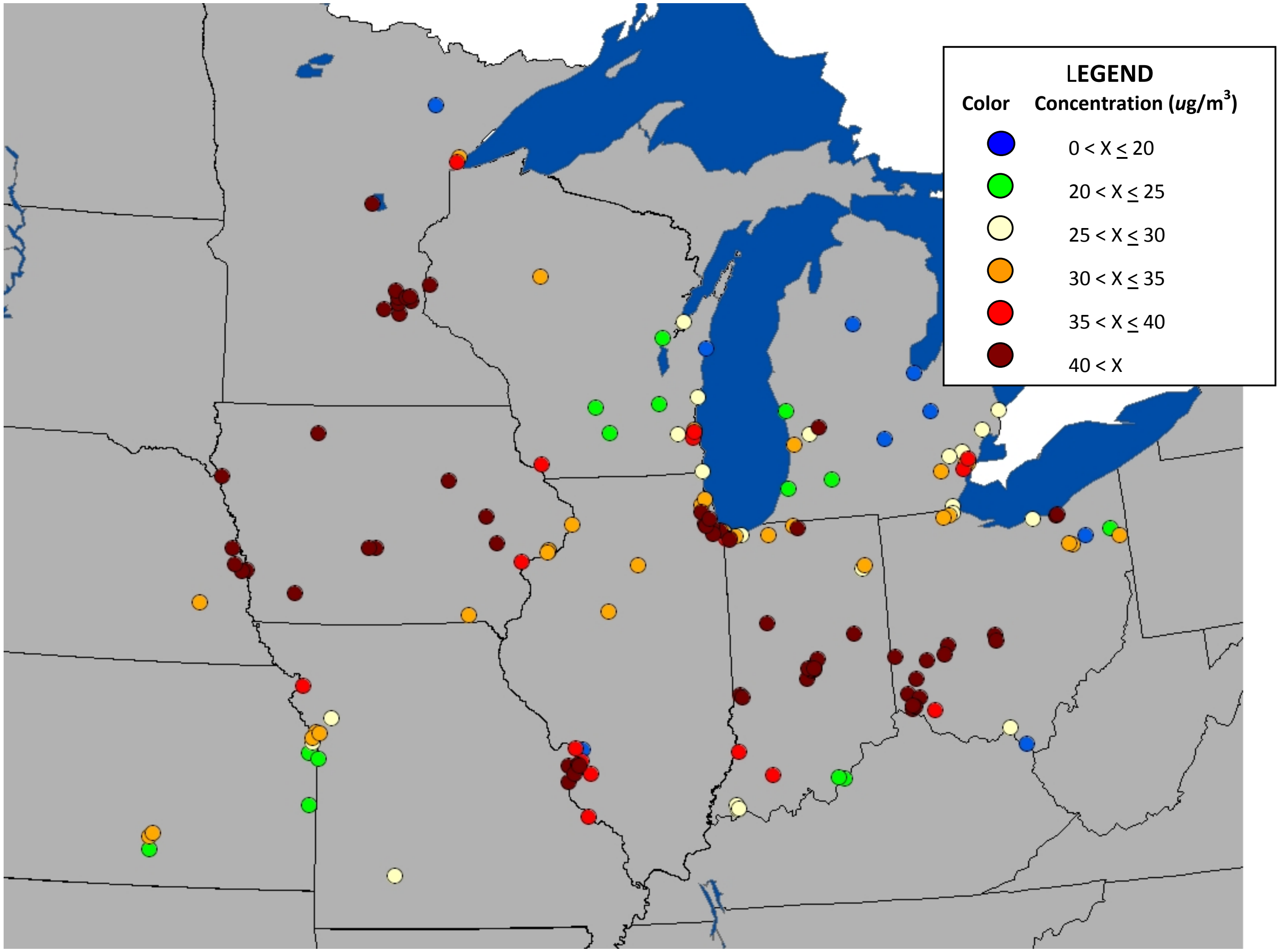

Figure 1. January 31, 2005.

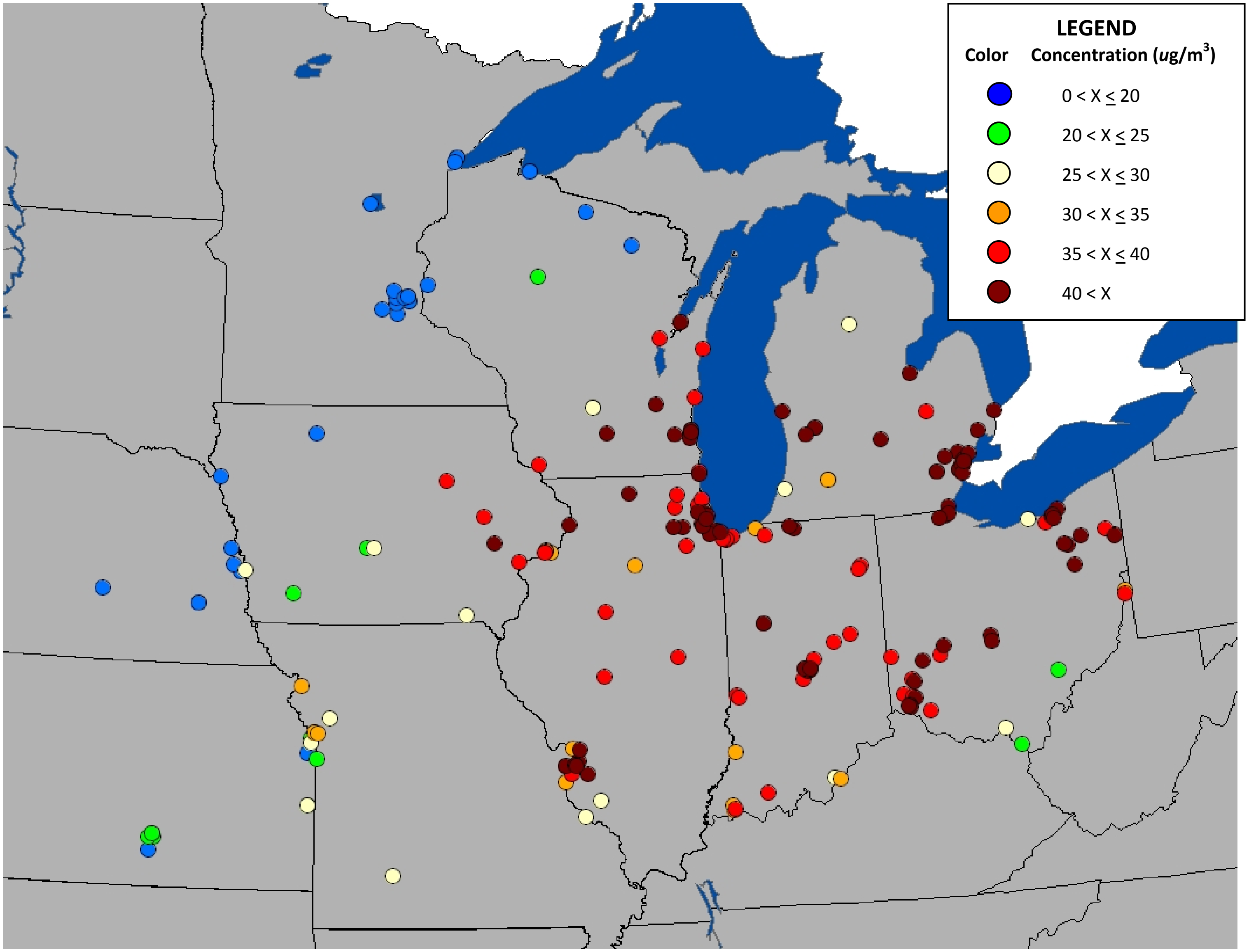

Figure 2. February 3, 2005.

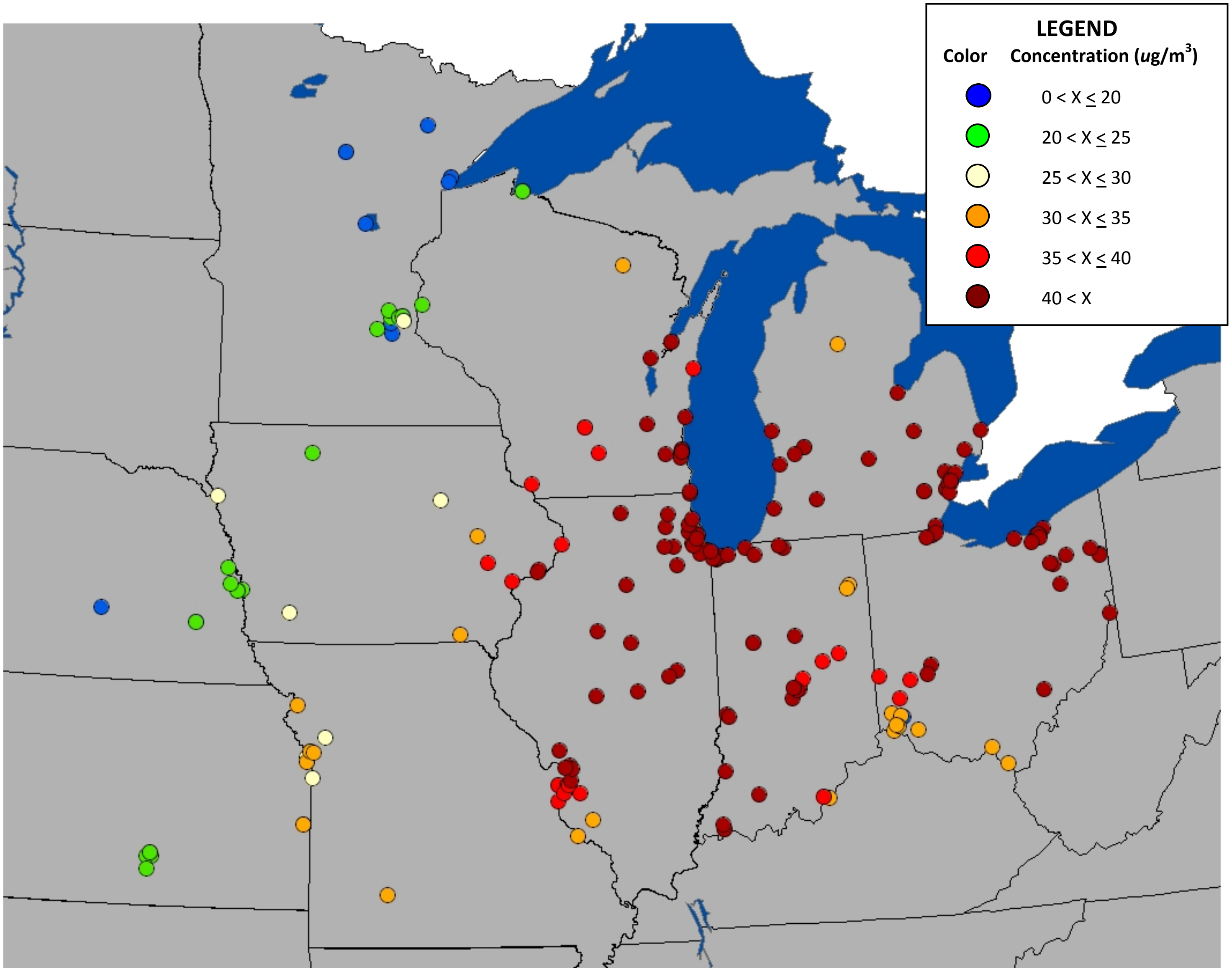

Figure 3. June 27, 2005.

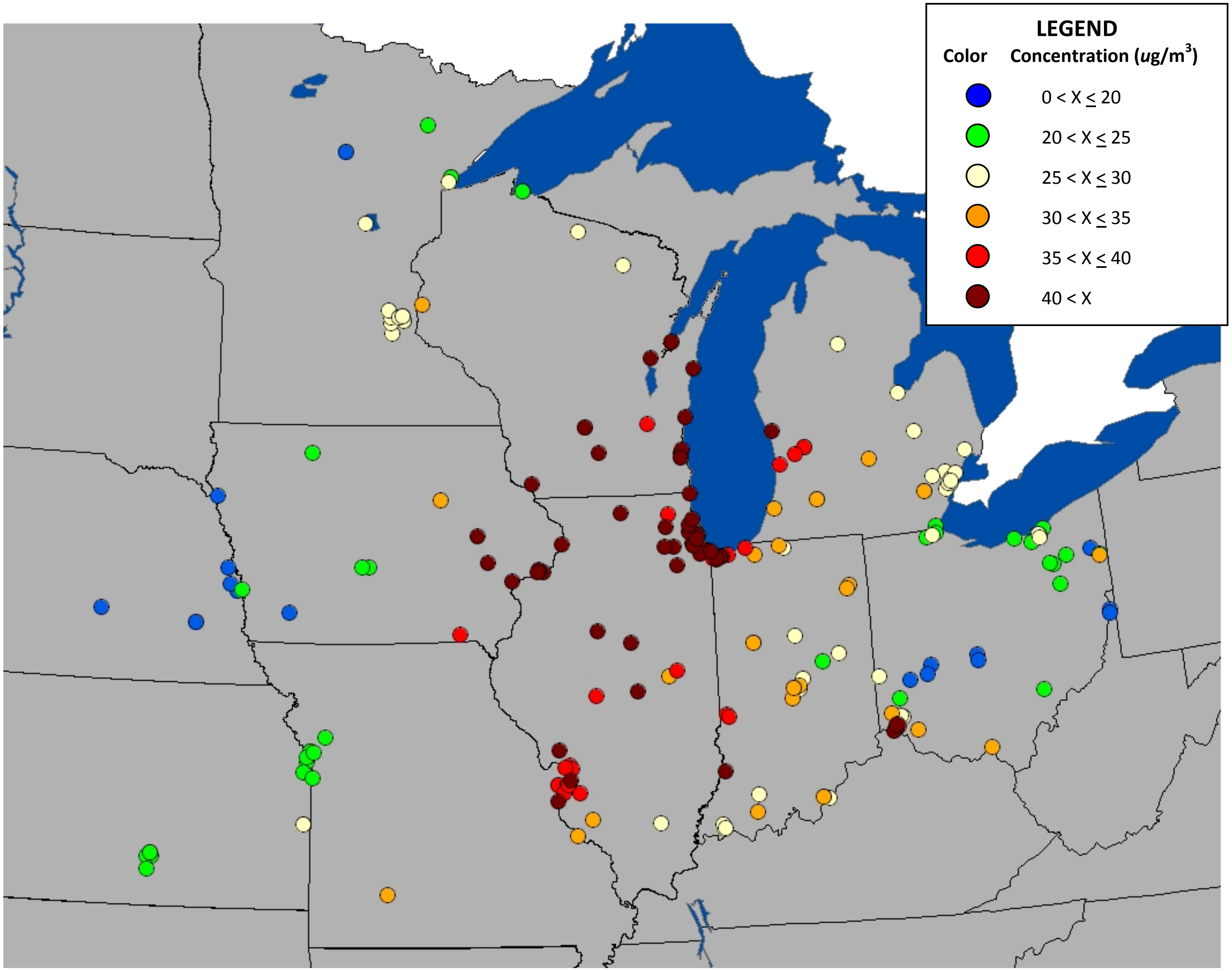

Figure 4. August 2, 2005.

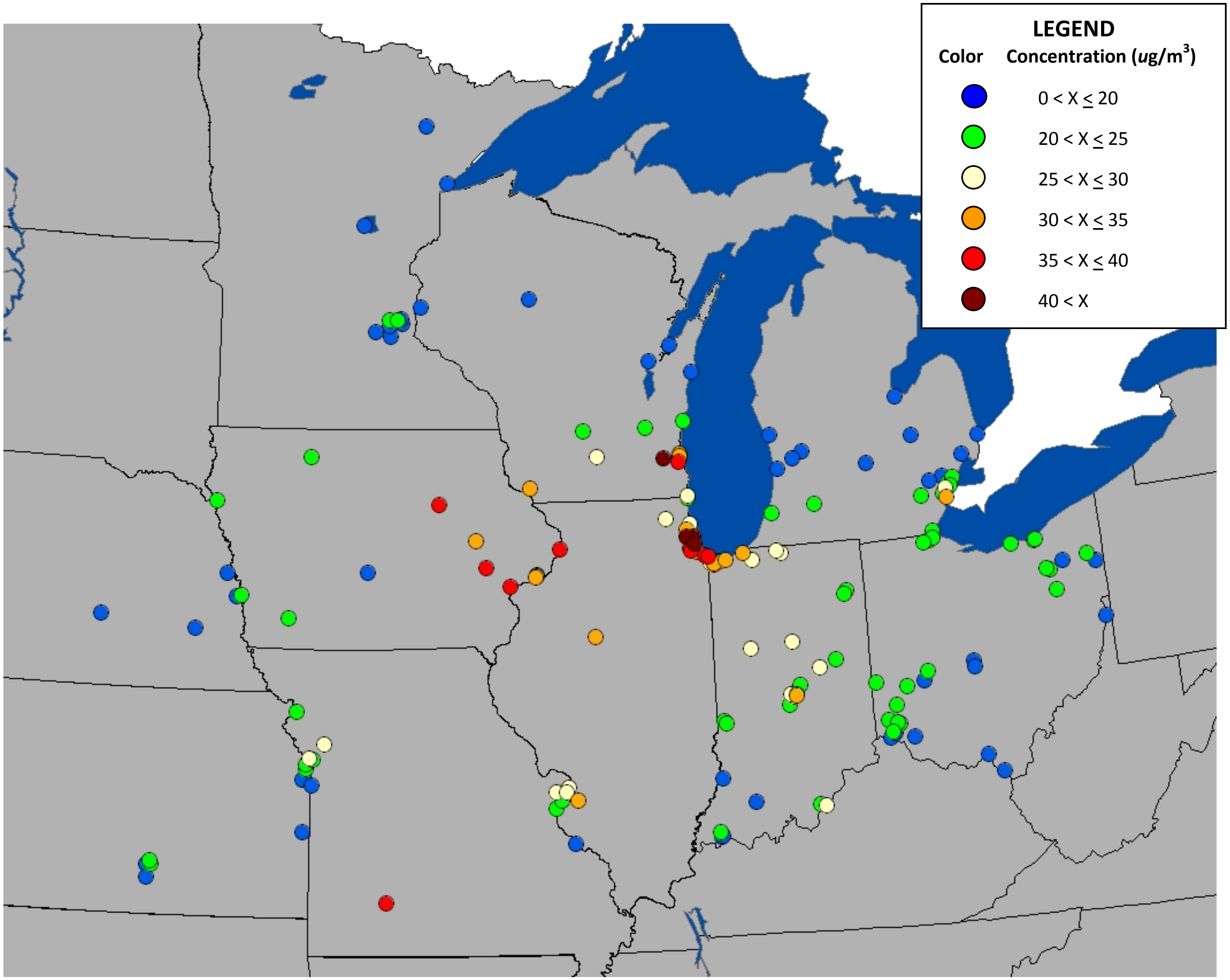

Figure 5. December 21, 2005.

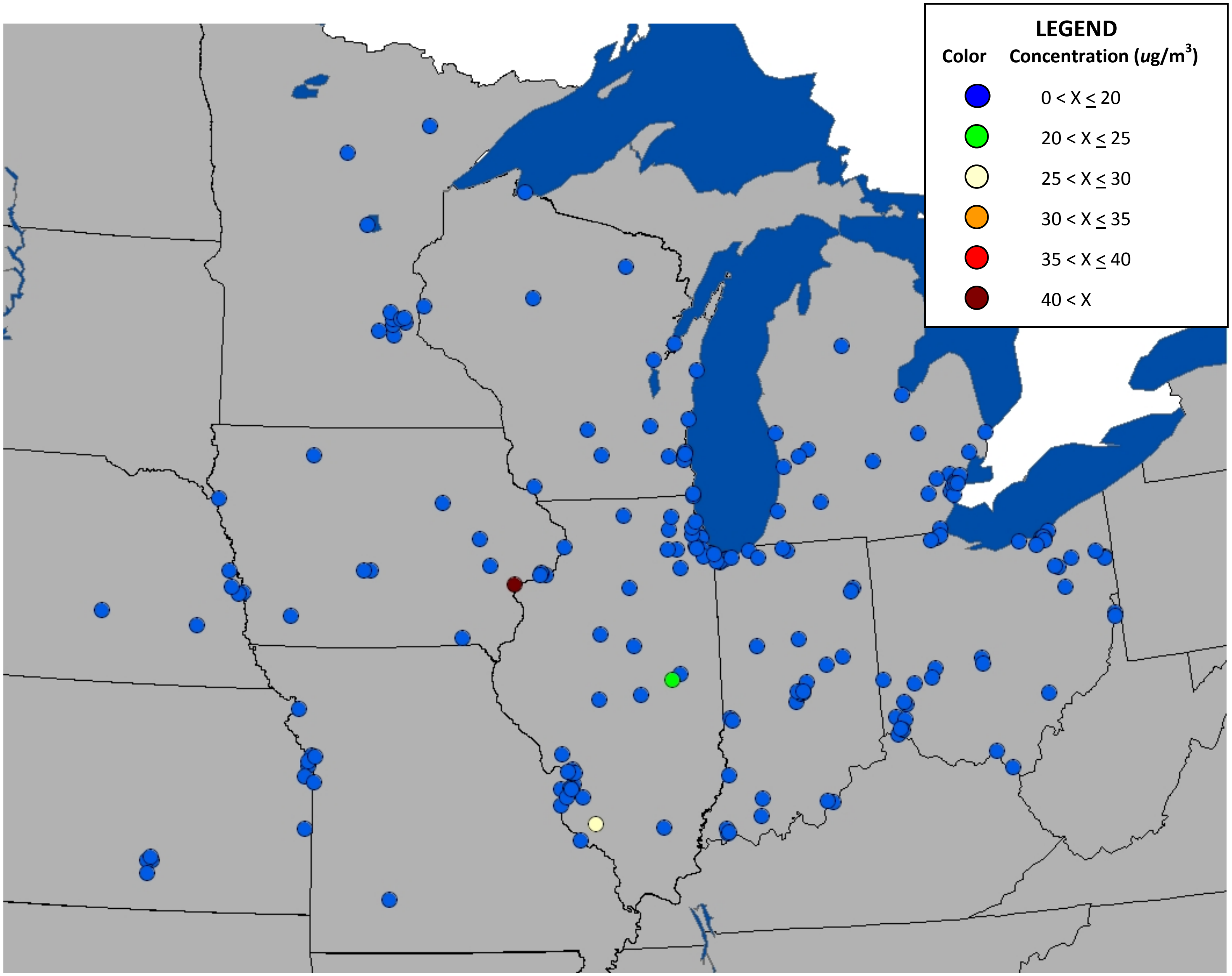

Figure 6. February 23, 2007.

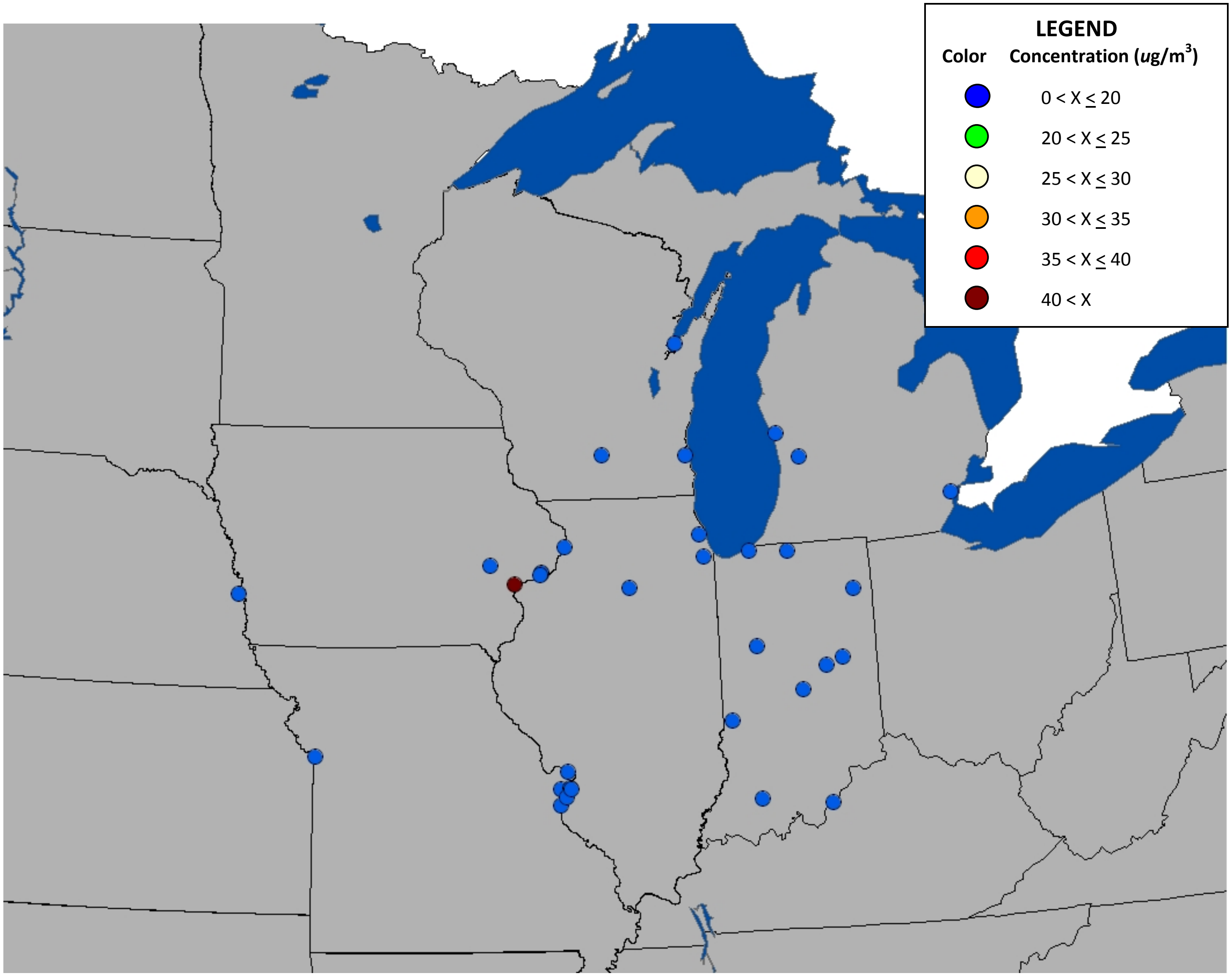

Figure 7. February 24, 2007.

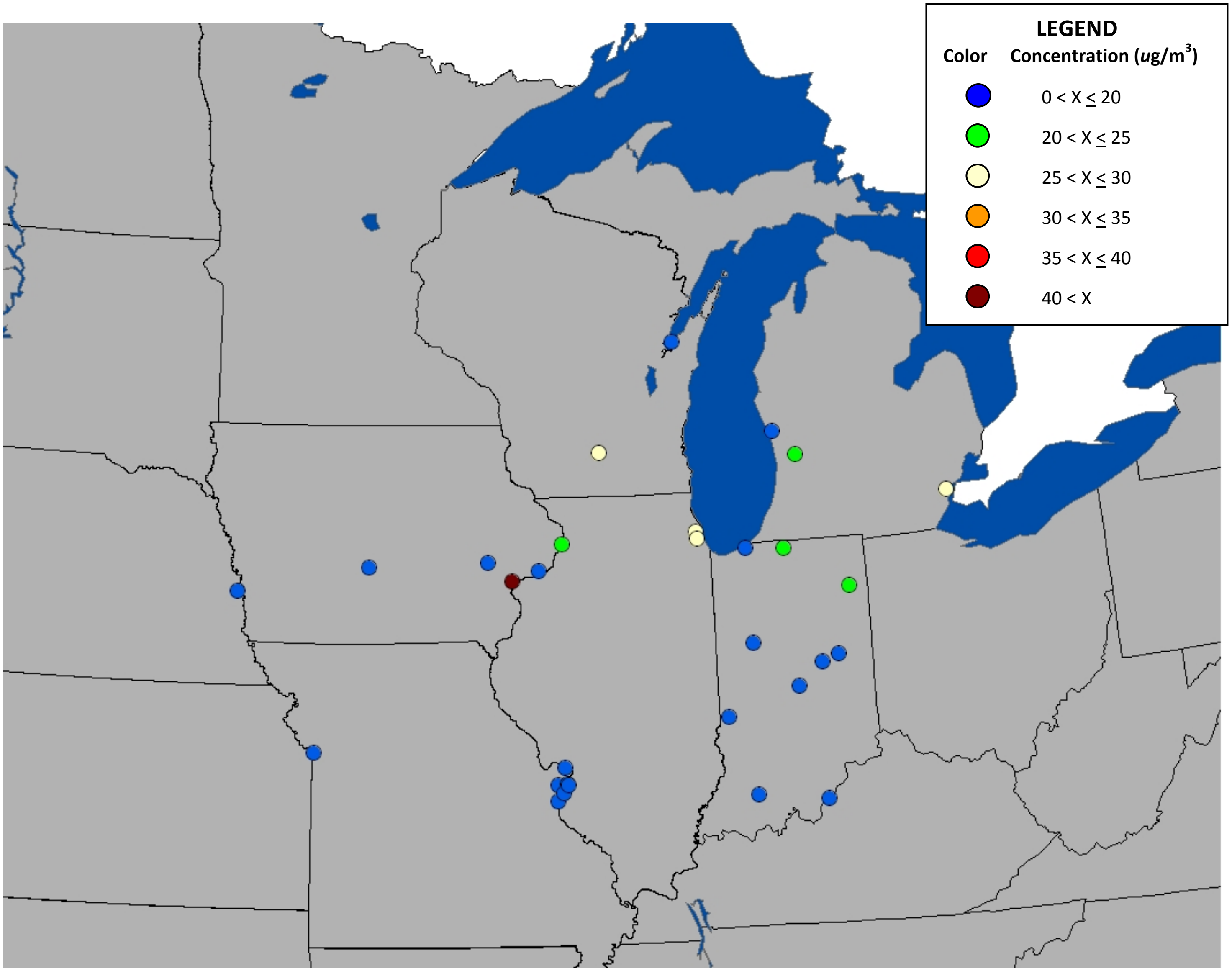

Figure 8. February 28, 2007.

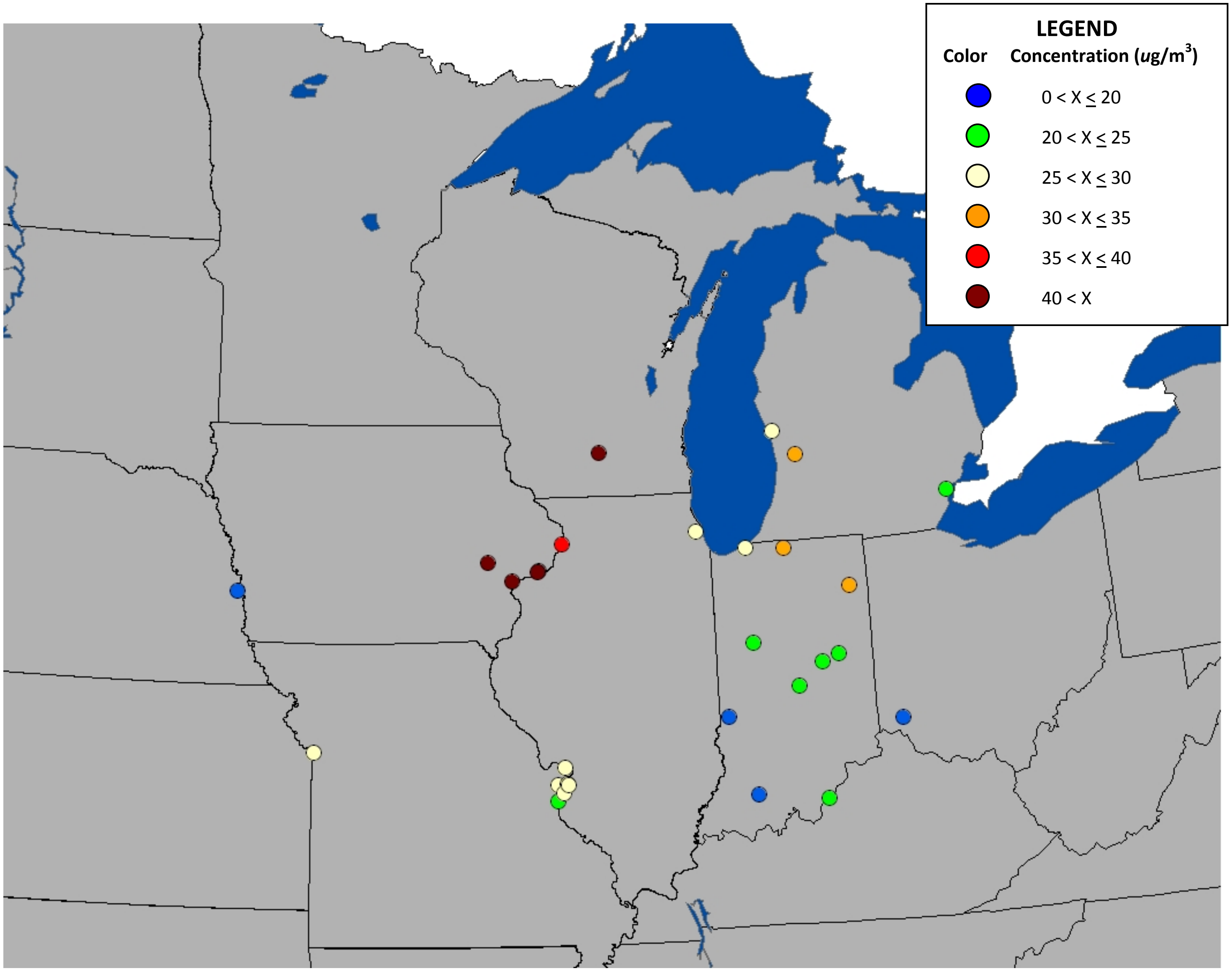

Figure 9. March 9, 2007.

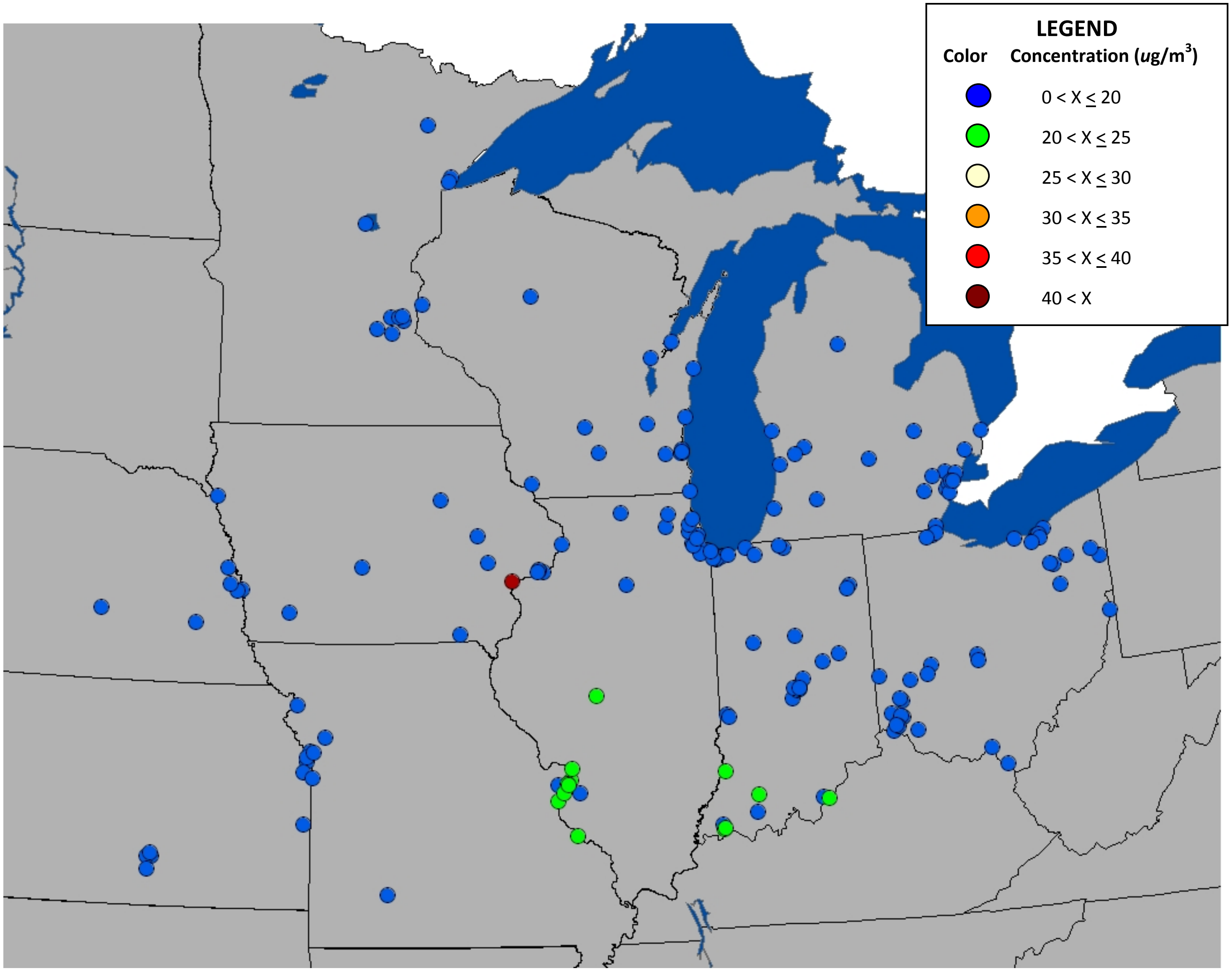

Figure 10. May 3, 2007.

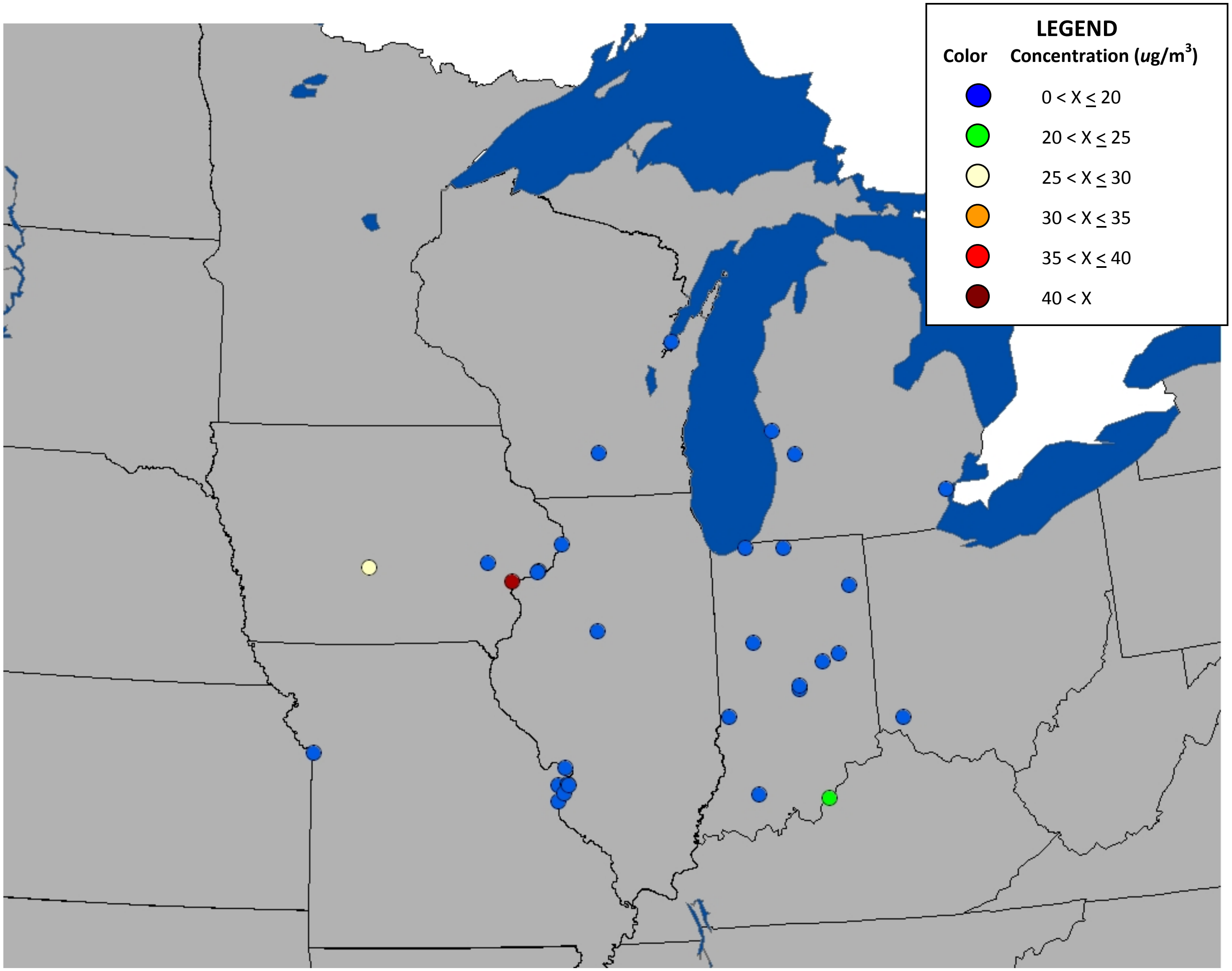

Figure 11. May 4, 2007.

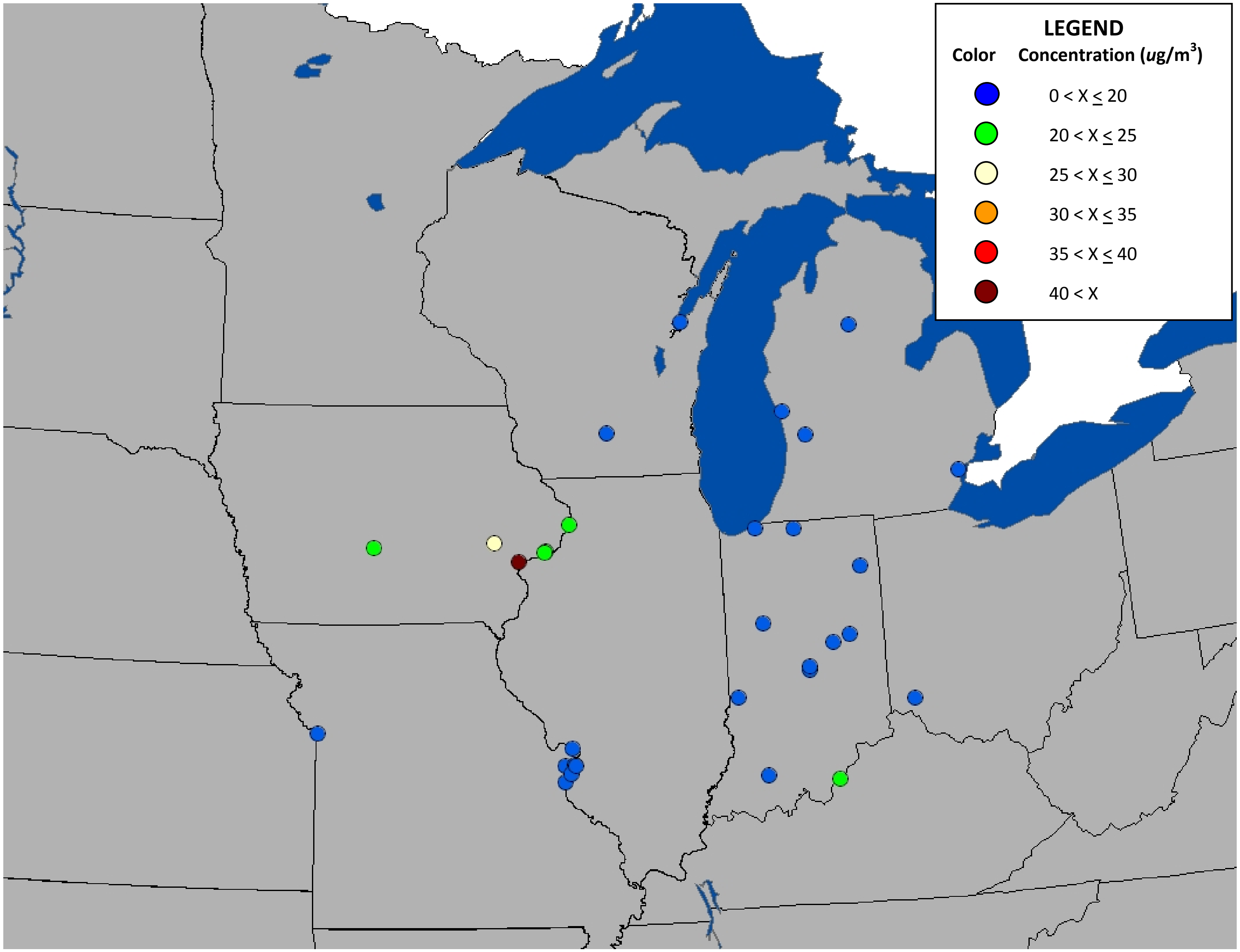

Figure 12. May 5, 2007.

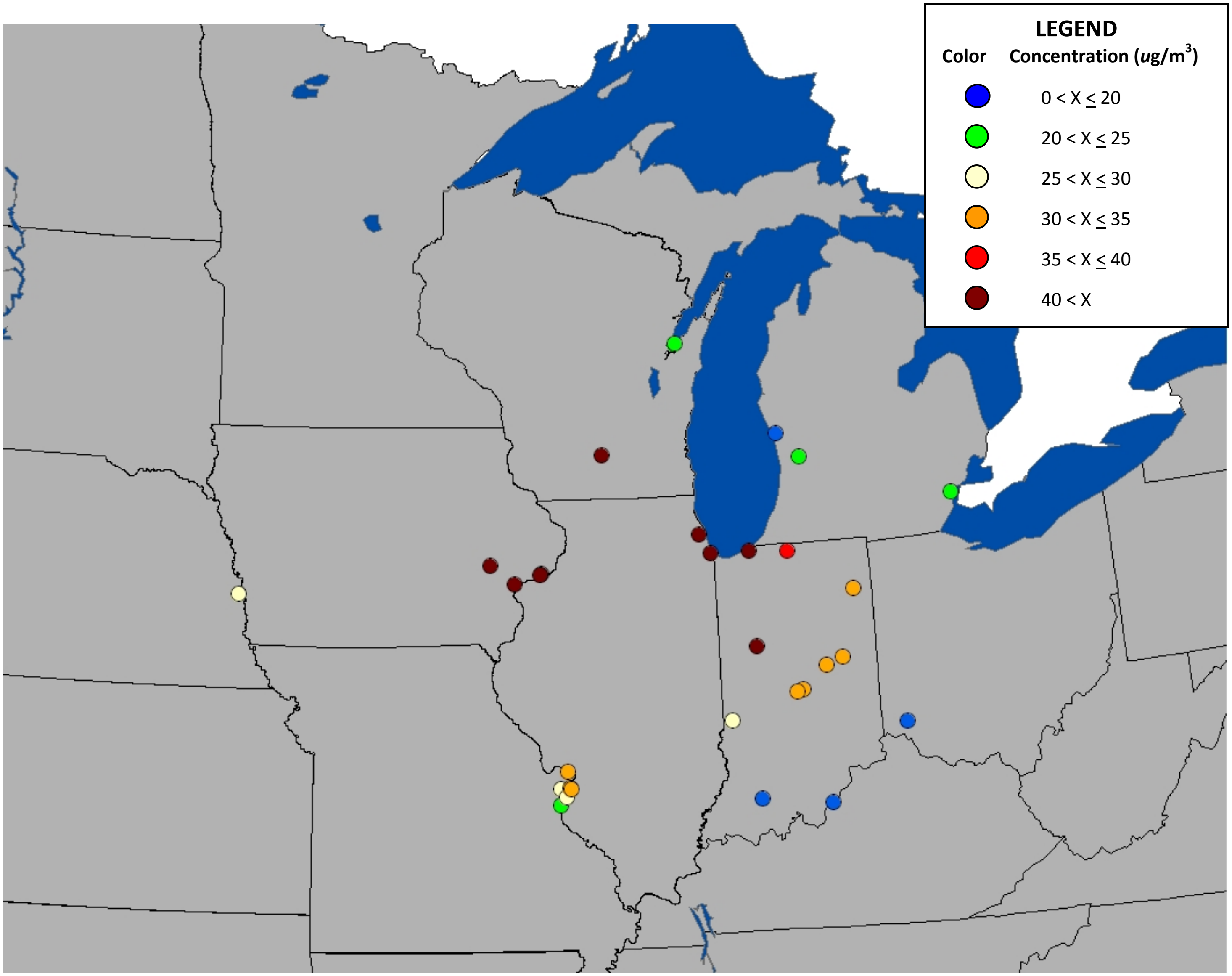

Figure 13. December 19, 2007.

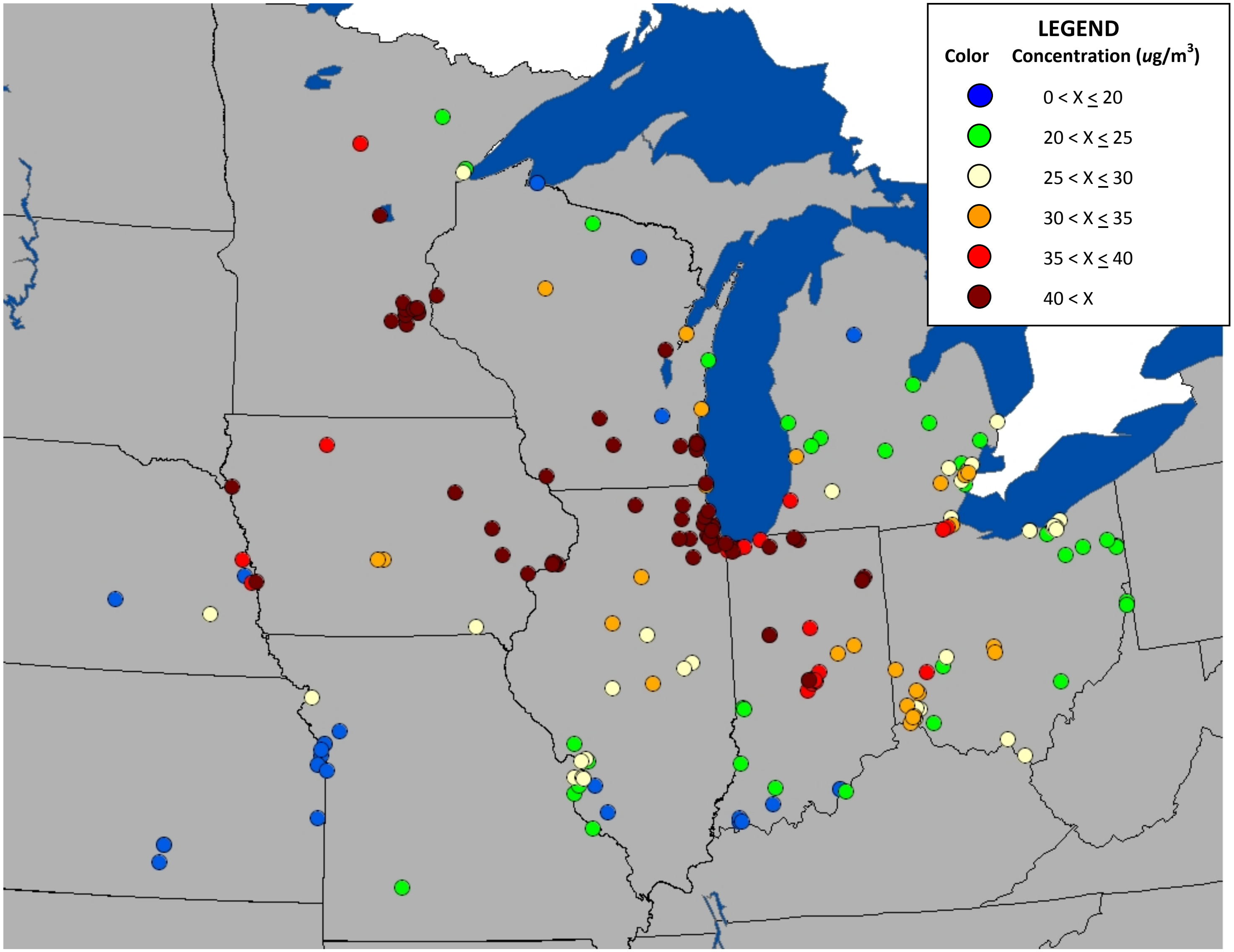

Figure 14. December 20, 2007.

Appendix D. Concentration Differences versus Wind Direction

Meteorological data is from the National Weather Service (NWS) KDVN ASOS station in Davenport, Iowa.

Concentration differences for Blackhawk Foundry monitor and Garfield School monitor were calculated from data retrieved from EPA's Air Quality System (AQS) in October 2008 for the two sites.

Data collected from 2005 through 2007.

Concentrations and Design Values are expressed in micrograms per cubic ($\mu g/m^3$)

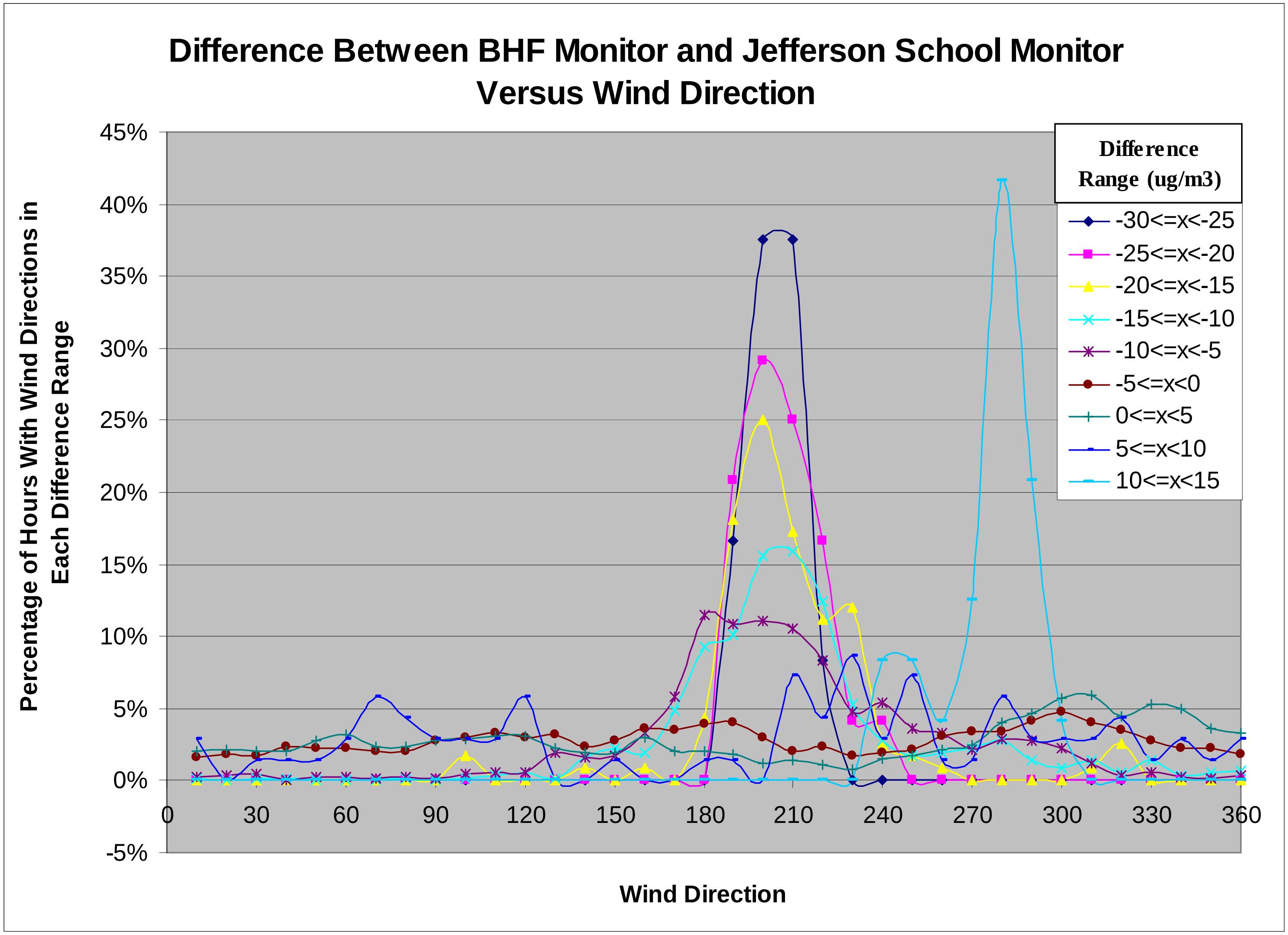

Figure 1. Differences between the Blackhawk Foundry monitor and the Jefferson School Monitor (as percentage of hours in each difference range) plotted against wind direction.

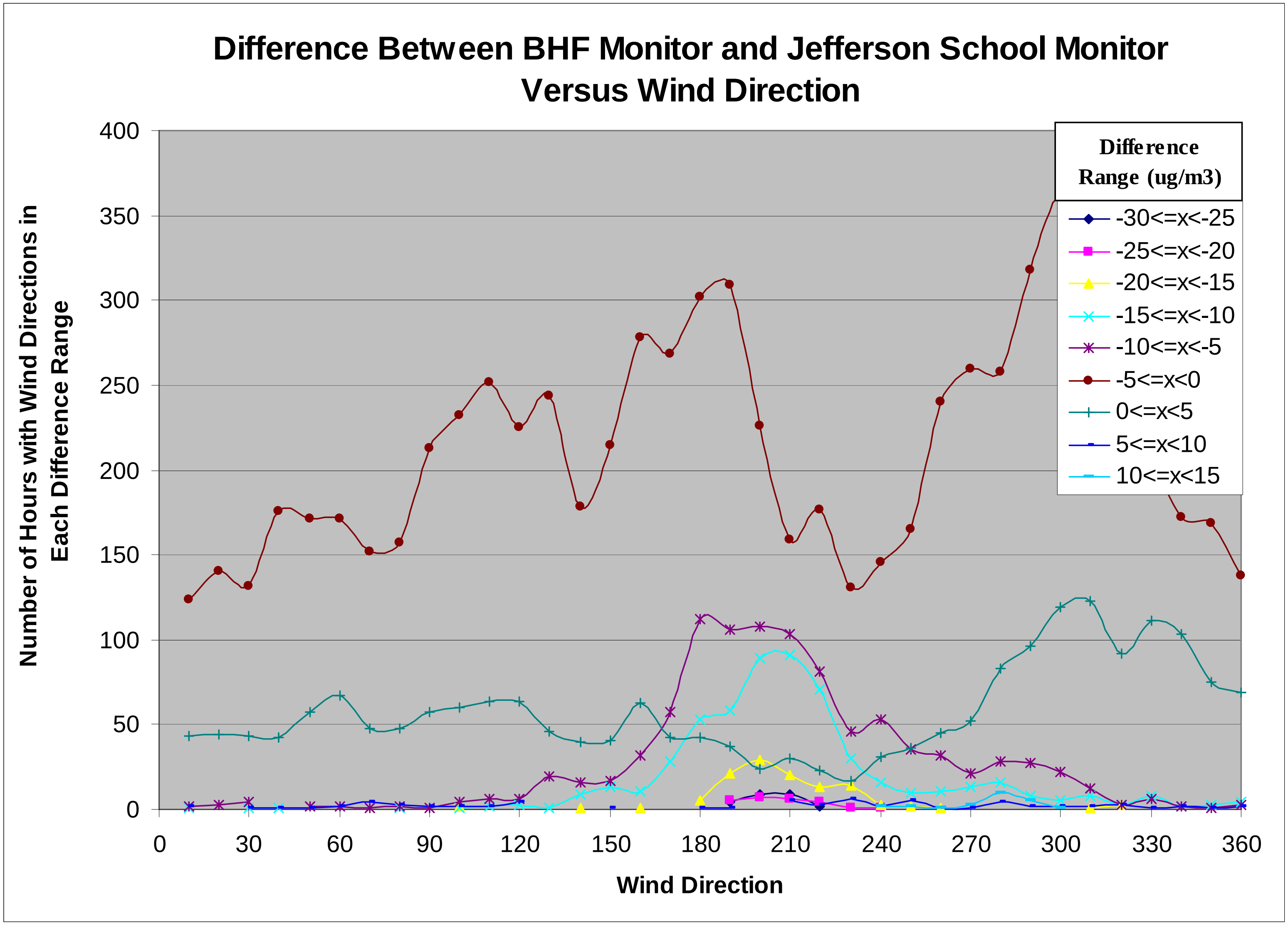

Figure 2. Differences between the Blackhawk Foundry monitor and the Jefferson School Monitor (as number of hours in each difference range) plotted against wind direction.

Appendix E. Pollution Rose and Pollution Difference Rose Diagrams

An analysis technique employed to assess the pollutant transport characteristics at the monitor location is a pollution rose. This graphical plot is similar in interpretation to a wind rose, except binned wind speed is replaced by $PM_{2.5}$ concentrations, measured by the Filter Dynamics Measurement System - Tapered Element Oscillating Microbalance (FDMS-TEOM) sampler located at the monitoring site. Hourly $PM_{2.5}$ concentrations are paired with hourly wind directions measured by the most representative ASOS meteorological data set. This analysis shows the relative frequency of $PM_{2.5}$ concentrations measured while winds were observed from each direction. However, while the FDMS-TEOM instrumentation is used for continuous $PM_{2.5}$ measurements it is not the Federal Reference Method (FRM) for monitoring and calculating the $PM_{2.5}$ design values for a site. Also, while the hourly FDMS-TEOM measurements, when averaged daily, correlate well with the daily sampled FRM data (r^2 of 0.9166), EPA has not defined a standard particle conditioning protocol for continuous monitors and therefore hourly values between different sampling sites and methods may vary.

The following pollution roses Figures 1-3, were created from raw hourly data from the FDMS-TEOM monitors at the two Davenport sites as well as the site at Lake Sugema. Davenport roses were created from the Davenport KDVN ASOS meteorological data. Lake Sugema roses were created using meteorological data from the ASOS station in Cedar Rapids (KCID).

The Blackhawk Foundry Site pollution rose clearly shows that the highest hourly pollutant values are measured when the wind direction is from the south and southwest (from the direction of the foundry). The Davenport, Jefferson School and Lake Sugema pollution roses show that there are relatively few elevated hourly measurements when the wind is from the direction of the foundry. These pollution roses demonstrate that there is a significant fine particulate source located SSW of the Blackhawk Foundry monitor that is not evident at the Davenport, Jefferson School or the Lake Sugema sites.

Data used in this appendix is available from EPA's Air Quality System. Hourly values from the FDMS-TEOM monitors are not used for attainment decisions.

This appendix refers to some monitor sites by their common names. Sites included in this appendix are:

EPA Site Id	City	County	Site Name	Alternate Name
191630015	Davenport	Scott	Davenport, Jefferson School	10th and Vine
191630019	Davenport	Scott	Davenport, Blackhawk Foundry	Blackhawk Foundry
191770006	Keosauqua	Van Buren	Keosauqua, Lake Sugema	Lake Sugema

Pollution Rose, Raw FDMS-TEOM Data, Davenport, Jefferson School

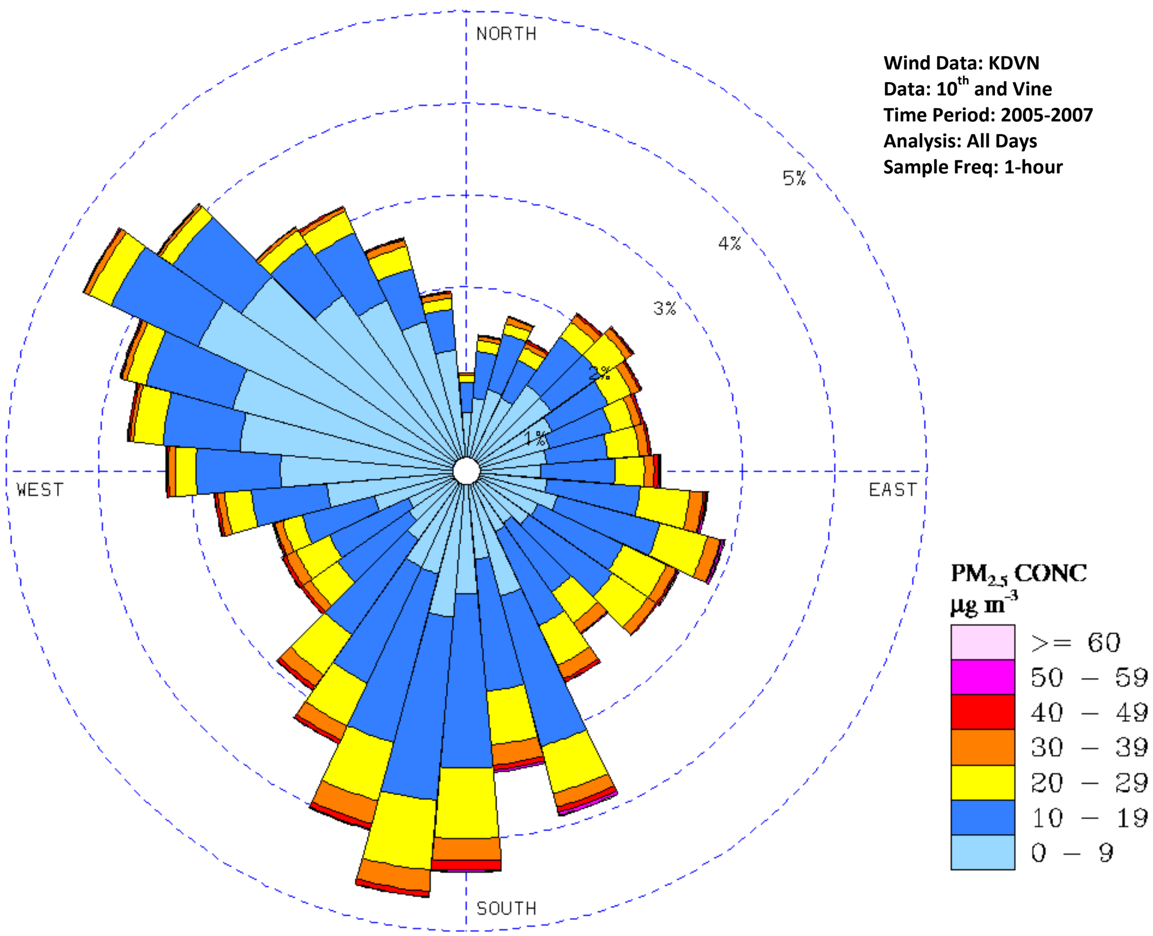

Figure 1. Raw Hourly Pollution Rose, Davenport, Jefferson School

Pollution Rose, Raw FDMS-TEOM Data, Davenport, Blackhawk Foundry

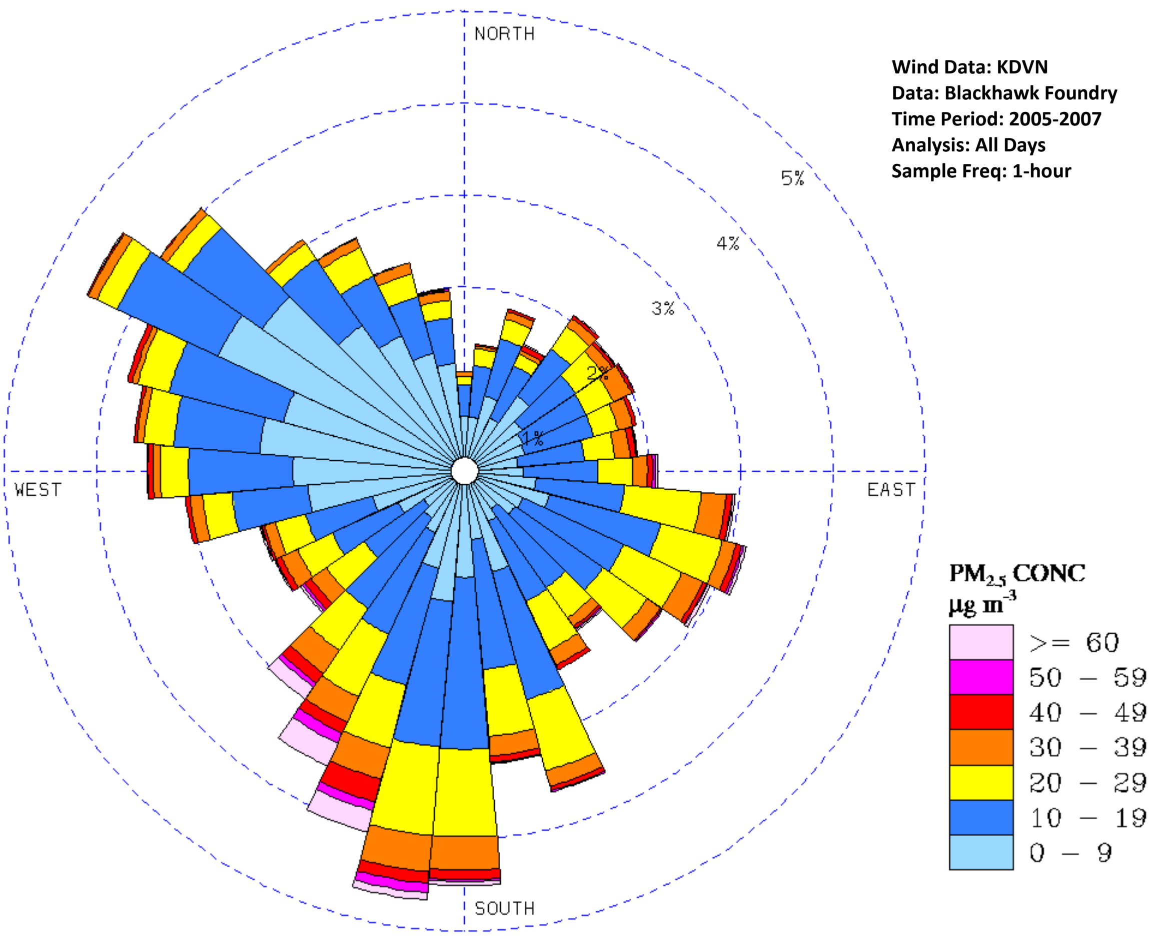

Figure 2. Raw Hourly Pollution Rose, Davenport, Blackhawk Foundry

Pollution Rose, Raw FDMS-TEOM Data, Keosauqua, Lake Sugema

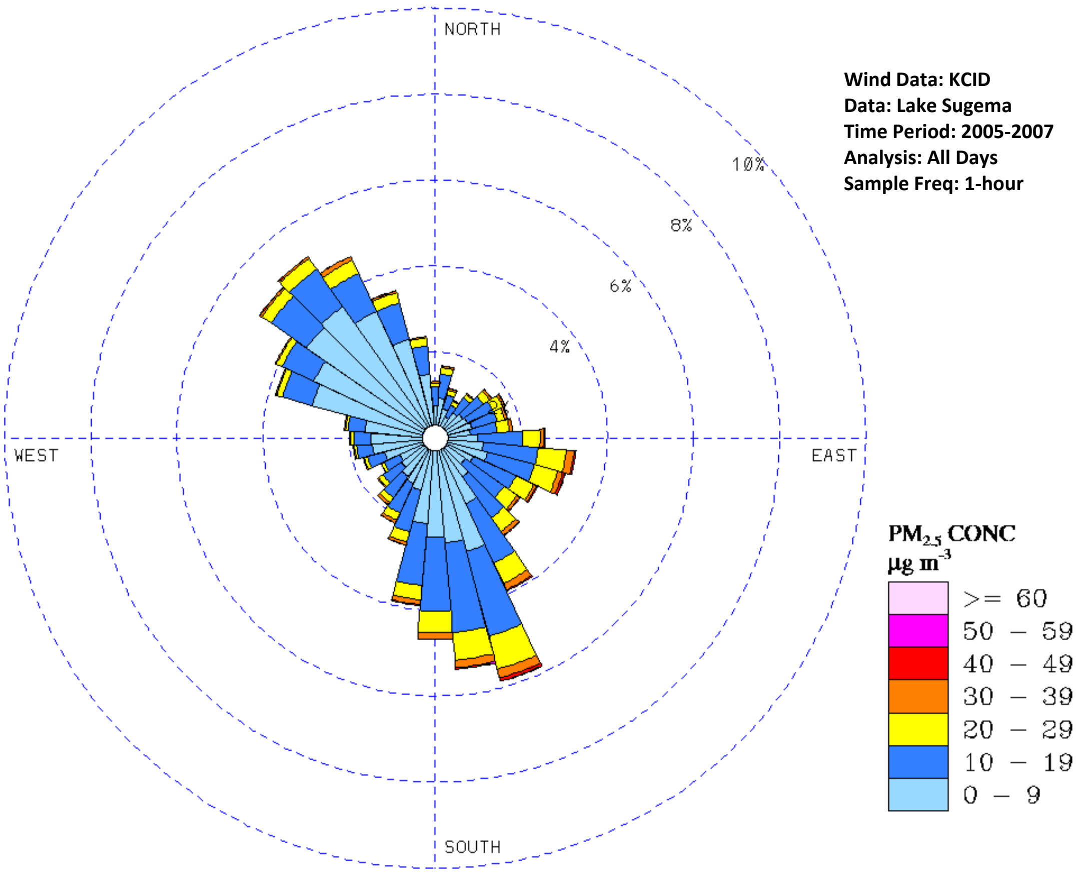

Figure 3. Raw Hourly Pollution Rose, Keosauqua, Lake Sugema

The historical FDMS-TEOM data can be normalized using the 24-hour FRM measurements to correct the hourly data to make it "FRM like" at each site. This normalized data can then be used to create pollution roses with the hourly FDMS-TEOM data. FDMS-TEOM data available at each site for 2005 through 2007 has been post corrected using the FRM data from the same site. The following table shows the data corrections used to make the data FRM like at three sites in eastern Iowa. Data correction algorithms are somewhat subjective as the relationship between the 24-hour values calculated from FDMS-TEOM data and FRM data can change due to season, instrument hardware changes, or changes in FDMS-TEOM performance.

Corrections Applied to FDMS-TEOM Hourly Data to Normalize to FRM Data			
Dates Correction Applied	**Equation of Trend Line**	**Correlation (R^2)**	**Correction Equation**
10th and Vine Corrections			
1/1/05 through 10/8/06	FDMS = 1.0748(FRM) + 1.341	0.945	(FDMS-1.341)/1.0748
10/9/06 through 4/10/07	FDMS = .984(FRM) - 1.61	0.882	(FDMS+1.61)/.984
4/11/07 through 12/31/07	FDMS =1.0188(FRM) + 1.44	0.965	(FDMS-1.442)/1.0188
Blackhawk Foundry Corrections			
1/1/05 through 2/28/05	FDMS = 1.0405(FRM) - 1.7996	0.961	(FDMS+1.7996)/1.0405
6/20/06 through 1/9/07	FDMS = 1.0536(FRM) + 2.237	0.909	(FDMS-2.237)/1.0536
1/10/07 through 2/14/07	FDMS = 1.0821(FRM) - 3.3926	0.941	(FDMS+3.3926)/1.0821
2/15/07 through 4/4/07	FDMS = 1.0893(FRM) - 0.1102	0.838	(FDMS+.1102)/1.0893
4/5/07 through 12/31/07	FDMS = 1.0303(FRM) + 0.7052	0.947	(FDMS-.7052)/1.0303
Lake Sugema Correction (five FRM outliers removed)			
Entire Period	FDMS = 0.993 (FRM) + 0.2924	0.936	(FDMS - .2924)/ 0.993

Figure 4. Data Correction Algorithms to Make FDMS-TEOM Data FRM Like

After correcting the hourly data to be FRM like, the hourly FDMS-TEOM data can be reduced back to 24-hour averages and again compared with the FRM data. Figures 5-7 below illustrate the results of the corrected FDMS-TEOM data compared with the FRM data from the corresponding site.

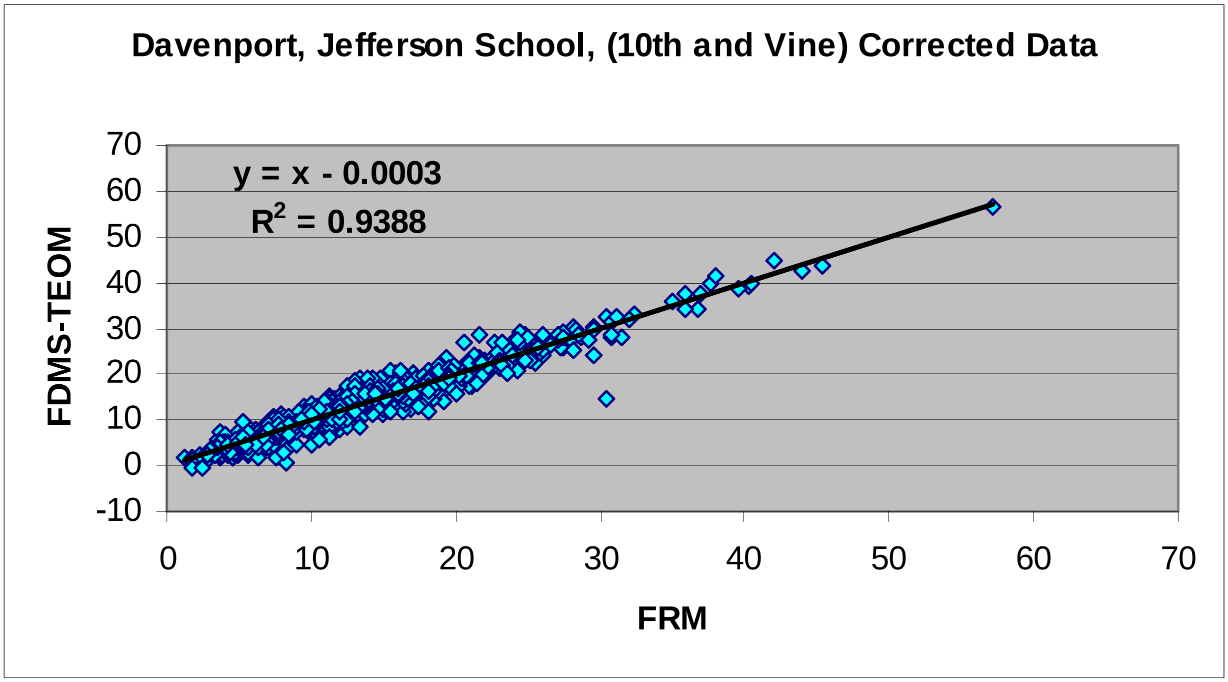

Figure 5. Corrected FDMS-TEOM Data vs. FRM at Davenport, Jefferson School

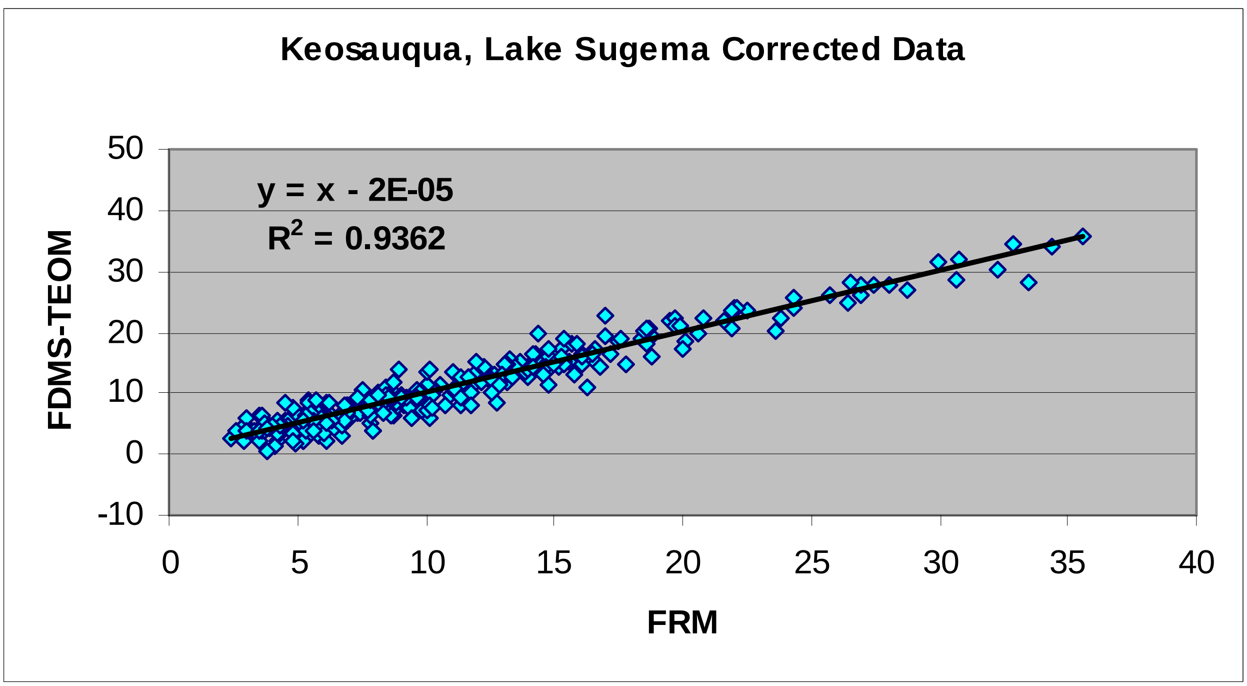

Figure 6. Corrected FDMS-TEOM Data vs. FRM at Keosauqua, Lake Sugema

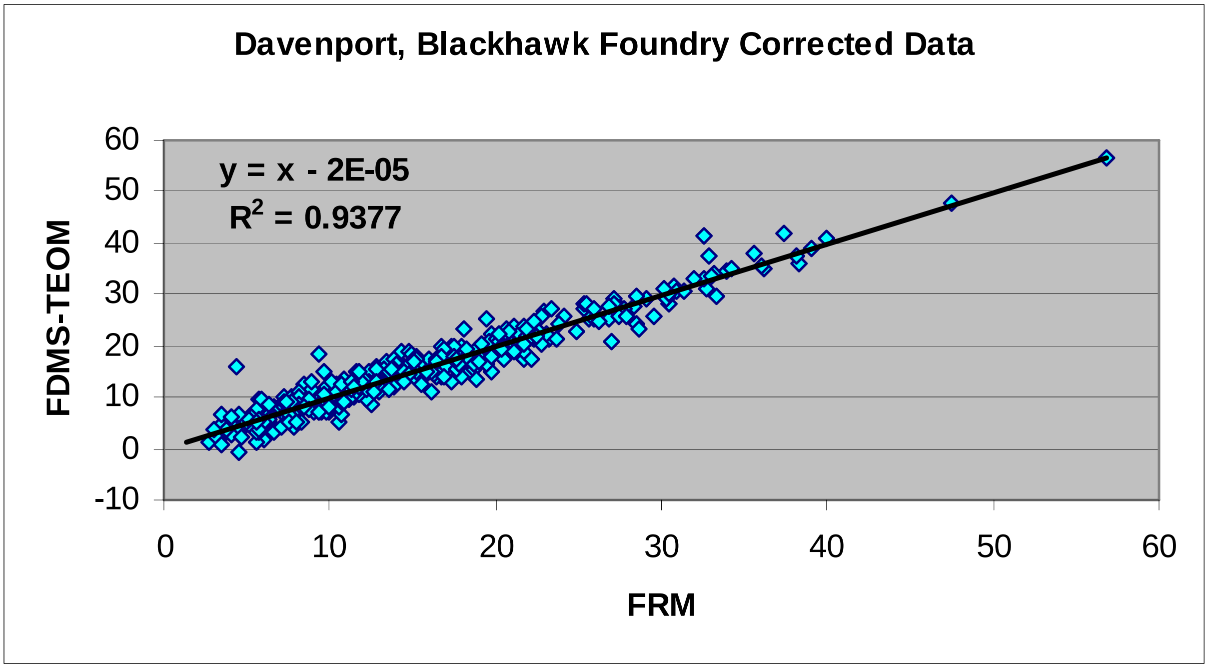

Figure 7. Corrected FDMS-TEOM Data vs. FRM at Keosauqua, Lake Sugema

Once a corrected FDMS-TEOM hourly data set has been developed, the normalized hourly data can be used to create pollution roses in the same way that the raw data was used. The pollution roses created from the normalized data are expected to better represent the hourly data collected at the site. Normalized pollution roses for the three sites are shown below in Figures 8-10. These roses are strikingly similar to the uncorrected or raw data roses and also indicate a significant source of fine particulate located SSW of the Blackhawk Foundry site which is not evident at the Jefferson School or Lake Sugema sites.

Pollution Rose, Normalized FDMS-TEOM Data, Davenport, Jefferson School

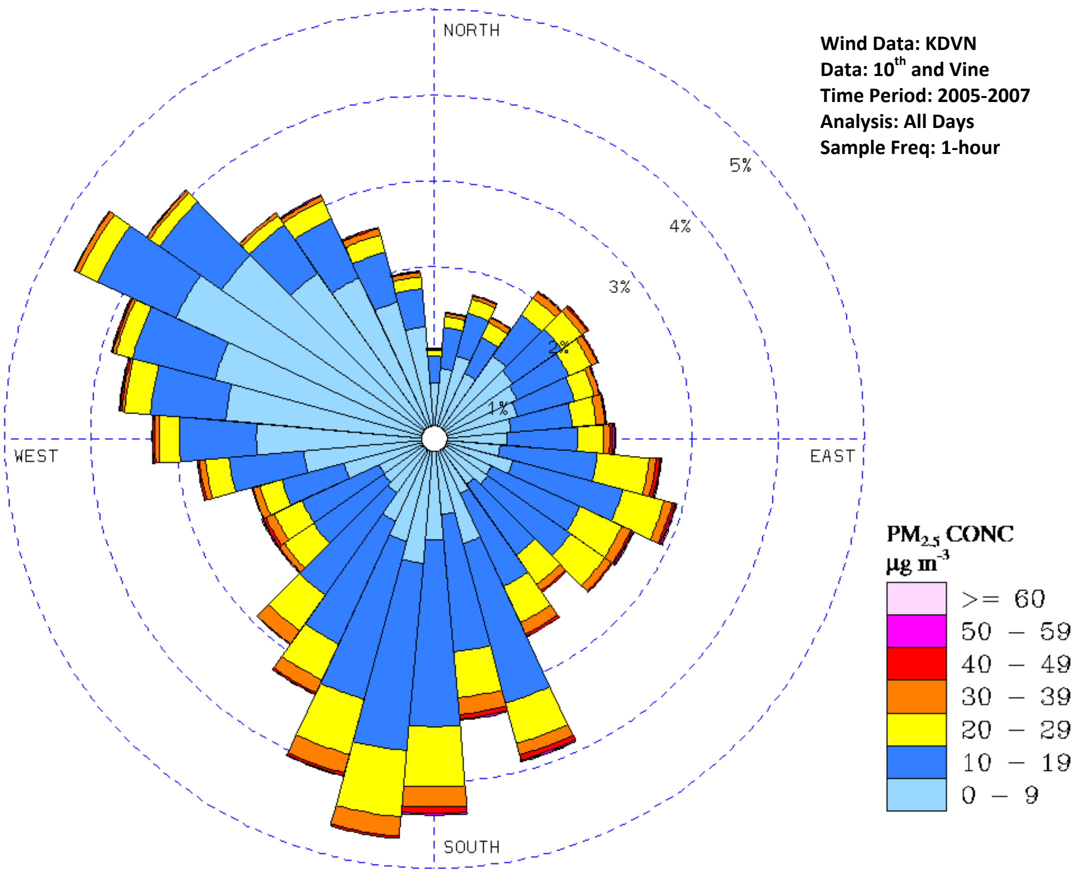

Figure 8. Normalized Pollution Rose, Davenport, Jefferson School

Pollution Rose, Normalized FDMS-TEOM Data, Davenport, Blackhawk Foundry

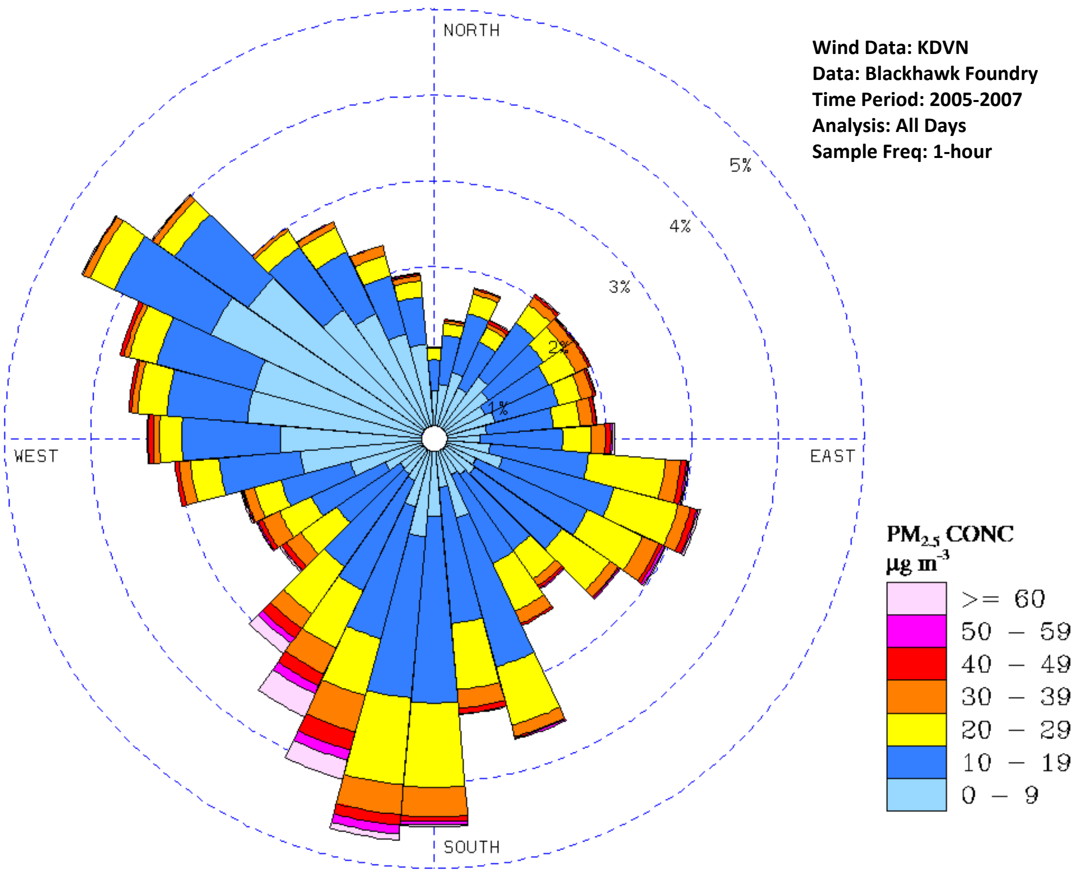

Figure 9. Normalized Pollution Rose, Davenport, Blackhawk Foundry

Pollution Rose, Normalized FDMS-TEOM Data, Keosauqua, Lake Sugema

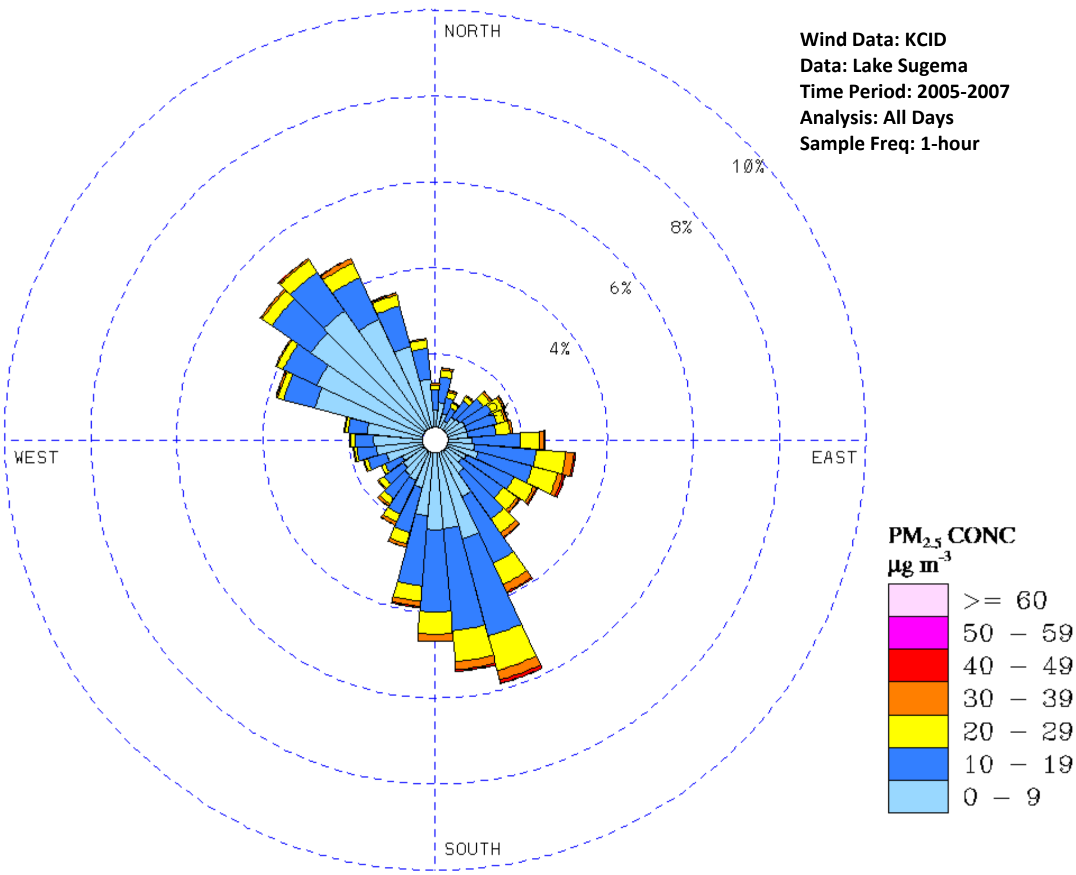

Figure 10. Normalized Pollution Rose, Keosauqua, Lake Sugema

Pollution roses can be created that are designed to show the “excess” pollution measured at one site compared to another site located nearby. An excess pollution rose shows graphically which direction the wind is coming from when one monitor is measuring concentrations of $PM_{2.5}$ that are higher than a nearby monitor. This graphical plot is similar in interpretation to a pollution rose, except the measured $PM_{2.5}$ concentrations are replaced by the difference in $PM_{2.5}$ concentrations between the two monitors of interest. The hourly concentrations measured by the Filter Dynamics Measurement System - Tapered Element Oscillating Microbalance (FDMS-TEOM) sampler located at the Blackhawk Foundry site are often higher than the concentrations measured by a similar monitor located at 10th and Vine, 1.8 miles to the northeast. FDMS-TEOM raw data as well as data that has been normalized with the FRM data has been used to create the following “excess” pollution roses. Once a corrected FDMS-TEOM hourly data set has been developed, the hourly data from one site can be subtracted from the hourly data from a nearby site to yield hourly excess pollution values. These values can be combined with wind direction data to create excess pollution roses. These excess pollution roses give insight into sources that have a significant influence on the pollution levels at a site. In all cases the Davenport meteorological data was used to generate the pollution roses. In essence, the excess pollution rose graphically represents the magnitude of difference between hourly values at two sites and which direction the wind was coming from during the hours of excess measurements. Excess pollution roses showing the direction the wind was coming from when the Blackhawk Foundry FSMS-TEOM monitor measured hourly readings higher than the hourly readings from the FDMS-TEOM monitor at 10th and Vine are shown in Figures 11 and 12. These excess pollution roses again demonstrate that there is a significant source of pollution SSW of the Blackhawk Foundry monitor site that is not evident at the 10th and Vine monitoring site.

Pollution Rose, Raw FDMS-TEOM Data, Davenport, Blackhawk Foundry minus Davenport, Jefferson School.

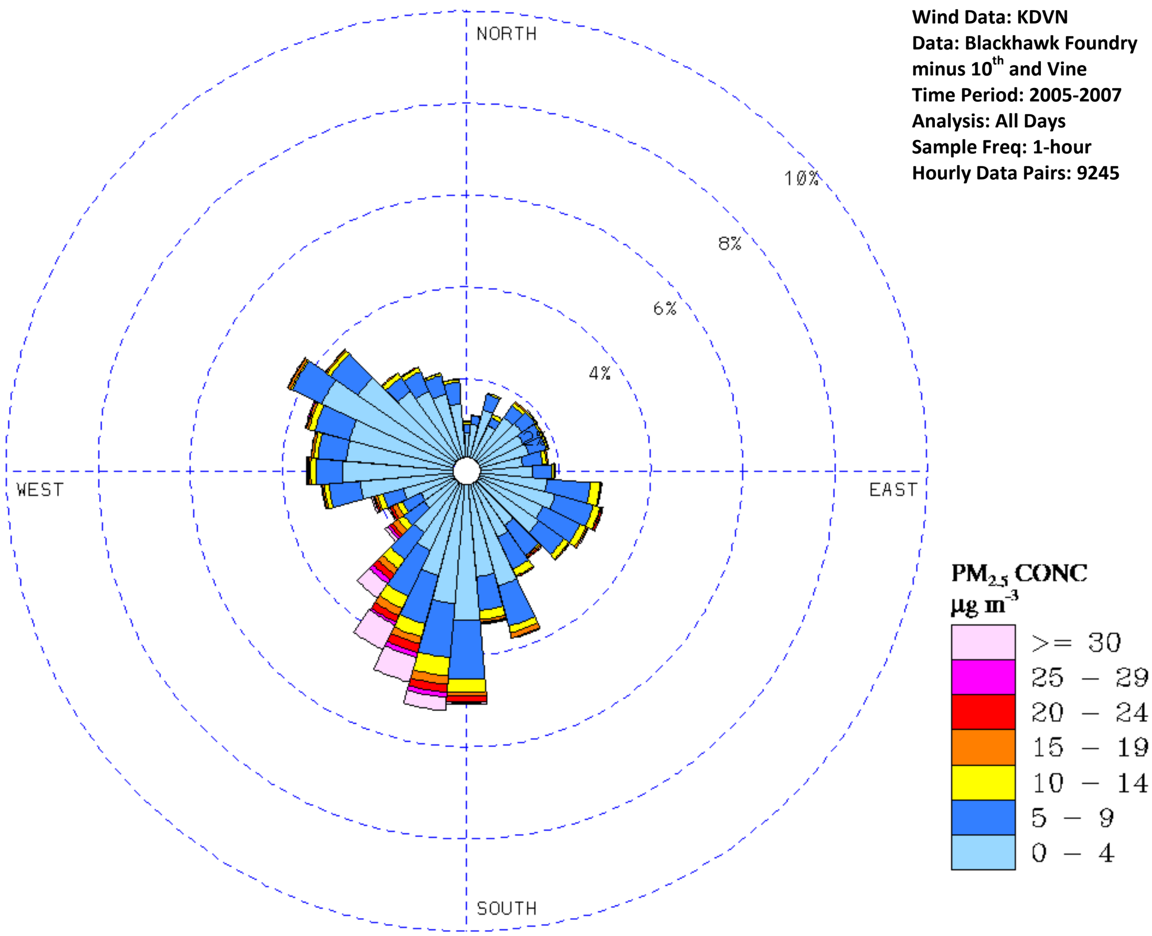

Figure 11. Raw Data Excess Pollution Rose, Blackhawk Foundry minus Jefferson School

Pollution Rose, Normalized FDMS-TEOM Data, Blackhawk Foundry minus Davenport, Jefferson School.

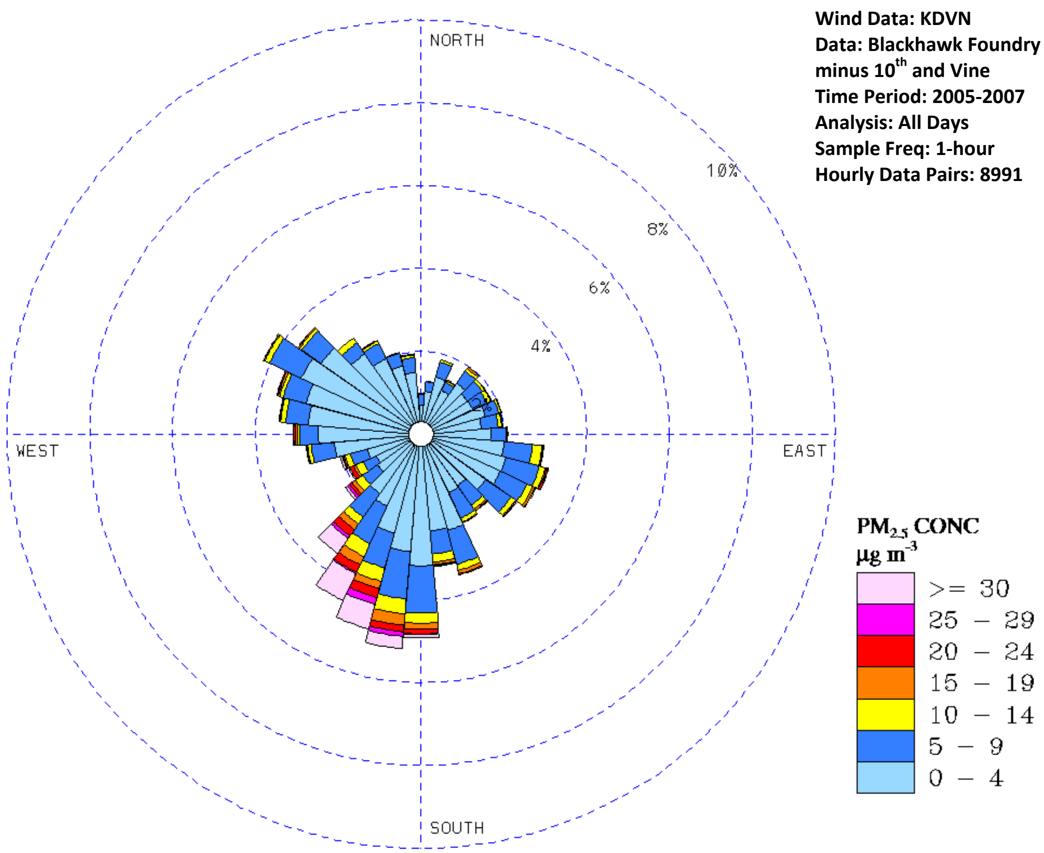

Figure 12. Normalized Data Excess Pollution Rose, Blackhawk Foundry minus Jefferson School

Excess pollution roses are created by subtracting the $PM_{2.5}$ values between two sites and only use data when one site is measuring pollution levels higher than the subtracted site. It is necessary to create excess roses by reversing the subtraction to show which direction the pollution is coming from when the second site measured more pollution than the first. Figures 13 and 14 show excess pollution roses created from 10th and Vine hourly data when the site measured higher $PM_{2.5}$ values than the Blackhawk Foundry site. An examination of the following roses show that the Blackhawk Foundry site does not normally measure values significantly higher than the 10th and Vine monitoring site. There are less than one-half as many data pairs available to create the excess rose diagrams. The roses indicate that winds from the northwest can occasionally lead to higher values measured at the 10th and Vine site when compared with the Blackhawk Foundry site. It should be noted that there is very little urban area northwest of the Blackhawk Foundry monitor and there is a considerable urban area northwest of the monitoring site at 10th and Vine. The roses do not indicate that the source of pollution SSW of Blackhawk Foundry has an appreciable effect on the fine particulate measured at the Jefferson School site.

Pollution Rose, Raw FDMS-TEOM Data, Davenport, Jefferson School minus Davenport, Blackhawk Foundry.

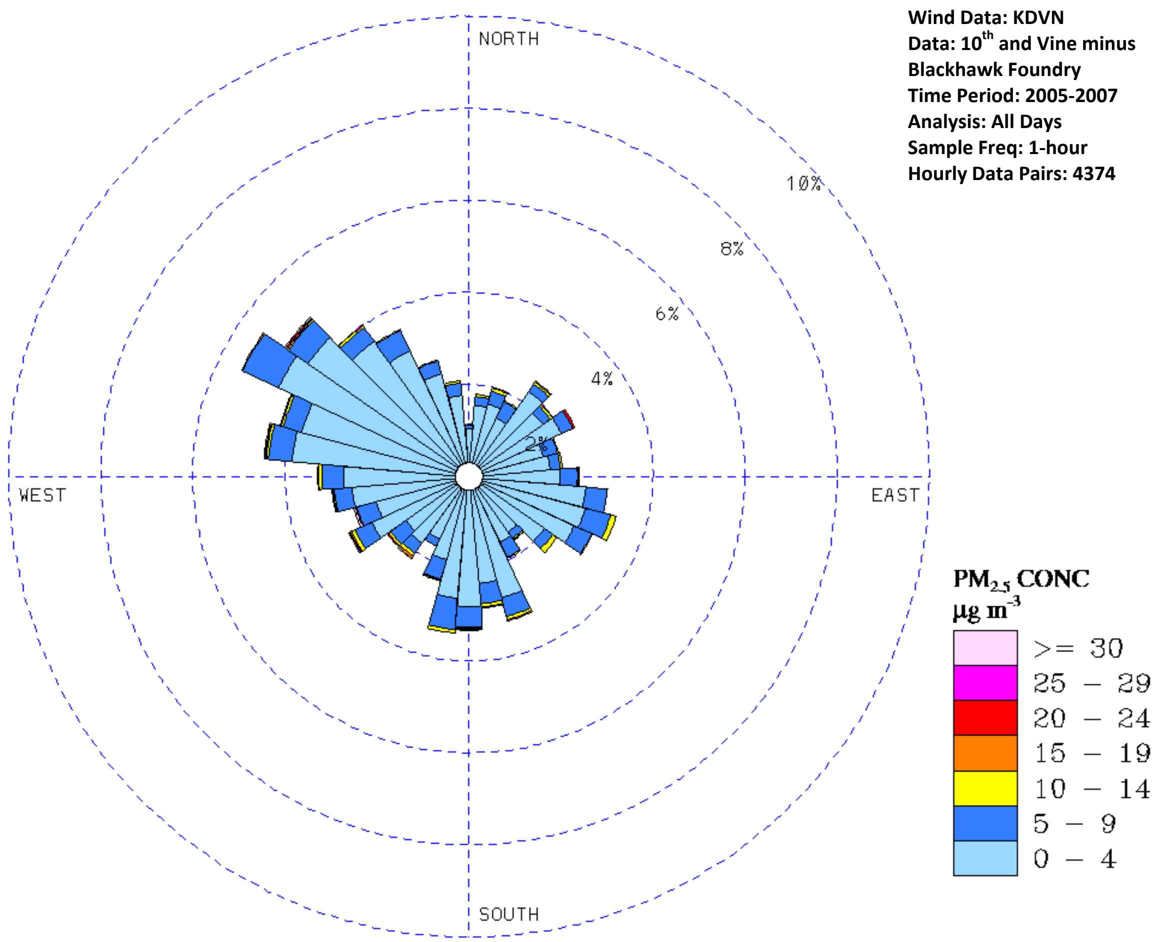

Figure 13. Raw Data Excess Pollution Rose, Jefferson School minus Blackhawk Foundry

Pollution Rose, Normalized FDMS-TEOM Data, Davenport, Jefferson School minus Davenport, Blackhawk Foundry.

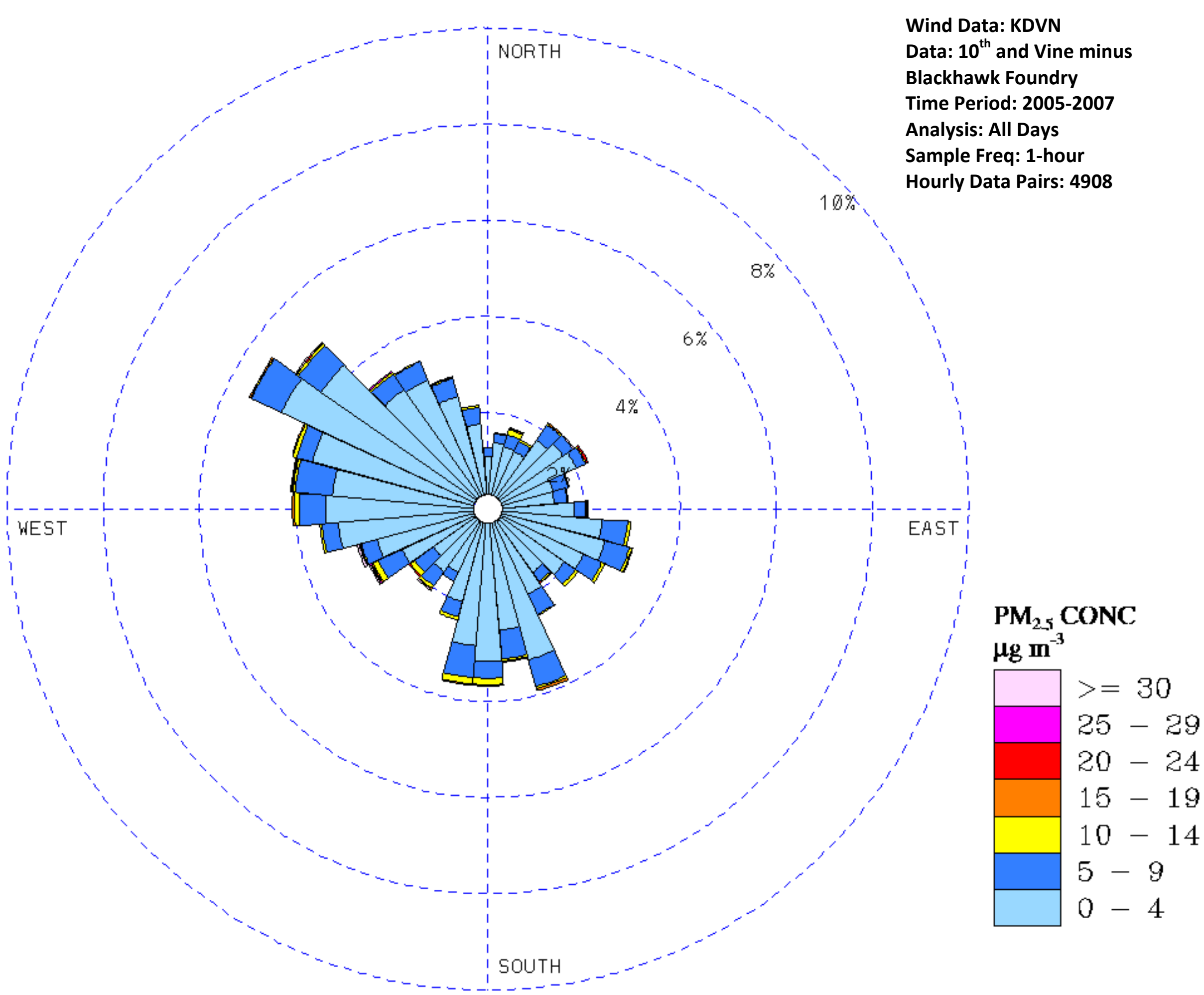

Figure 14. Normalized Data Excess Pollution Rose, Jefferson School minus Blackhawk Foundry

Appendix F. Differences between Design Values at Violating Monitors and Nearby Monitors

Design Values are calculated from federal reference method (FRM) data gathered during the period of 2005 to 2007. Design values are as reported from the EPA document, available on line at:

http://www.epa.gov/airtrends/pdfs/final%202005-2007%20PM2.5%20design%20values%20AQS%2008jul08.xls

Only sites with complete data or complete data after substitution ("A" and "NA") are included.

Design value concentrations are expressed in micrograms of particulate, per cubic meter of air at local conditions (µg/m^3).

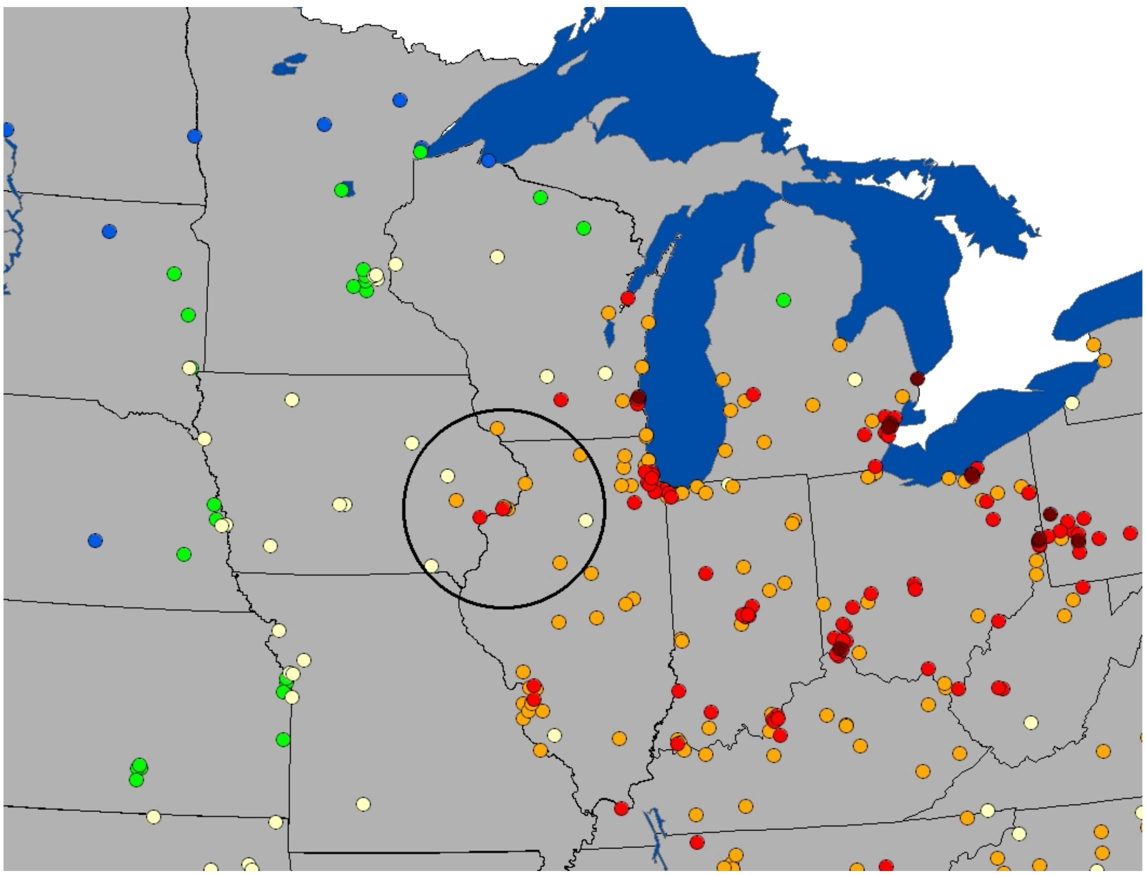

Figure 1. Monitors "Close To" Violating Monitors Lie Inside Indicated Circle of 100 mile radius.

Table 1.

EPA's Air Quality System Site ID's	
Site ID	**Name**
170990007	Illinois, Oglesby
171430037	Illinois, Peoria
171613002	Illinois, Arsenal Island
172010013	Illinois, Rockford
190450021	Clinton, Rainbow Park
191032001	Iowa City, Hoover Sch.
191130037	Cedar Rapids, Army Reserve
191390015	Muscatine, Garfield Sch.
191630015	Davenport, Jefferson Sch.
191630018	Davenport, Adams Sch.
191630019	Davenport, BH Foundry
191770006	Keosauqua, Lake Sugema
550430009	Wisconsin, Potoisi High Sch.

Table 2. Design Value Difference Relative to Blackhawk Foundry (37 $\mu g/m^3$)

Site Name	Design Value	Difference
Illinois, Oglesby	30	-7
Illinois, Peoria	33	-4
Illinois, Arsenal Island	31	-6
Illinois, Rockford	35	-2
Clinton, Rainbow Park	32	-5
Iowa City, Hoover Sch.	34	-3
Cedar Rapids, Army Reserve	29	-8
Muscatine, Garfield Sch.	36	-1
Davenport, Jefferson Sch.	31	-6
Davenport, Adams Sch.	32	-5
Keosauqua, Lake Sugema	28	-9
Wisconsin, Potoisi High Sch.	35	-2

Table 3. Design Value Difference Relative to Muscatine, Garfield School (36 µg/m^3)

Site Name	Design Value	Difference
Illinois, Oglesby	30	-6
Illinois, Peoria	33	-3
Illinois, Arsenal Island	31	-5
Illinois, Rockford	35	-1
Clinton, Rainbow Park	32	-4
Iowa City, Hoover Sch.	34	-2
Cedar Rapids, Army Reserve	29	-7
Davenport, Jefferson Sch.	31	-5
Davenport, Adams Sch.	32	-4
Davenport, BH Foundry	37	1
Keosauqua, Lake Sugema	28	-8
Wisconsin, Potoisi High Sch.	35	-1

Appendix G. Differences between Exceedance Day Concentrations at Violating Monitors and Nearby Monitors

Design Values are calculated from federal reference method (FRM) data gathered during the period of 2005 to 2007. Design values are as reported from the EPA document, available on line at:

http://www.epa.gov/airtrends/pdfs/final%202005-2007%20PM2.5%20design%20values%20AQS%2008jul08.xls

Only sites with complete data or complete data after substitution ("A" and "NA") are included.

The data used for exceedance days at Blackhawk Foundry and exceedance days at Garfield School were retrieved from EPA's Air Quality System (AQS) in October 2008. Concentrations are expressed in micrograms of particulate, per cubic meter of air at local conditions (µg/m^3).

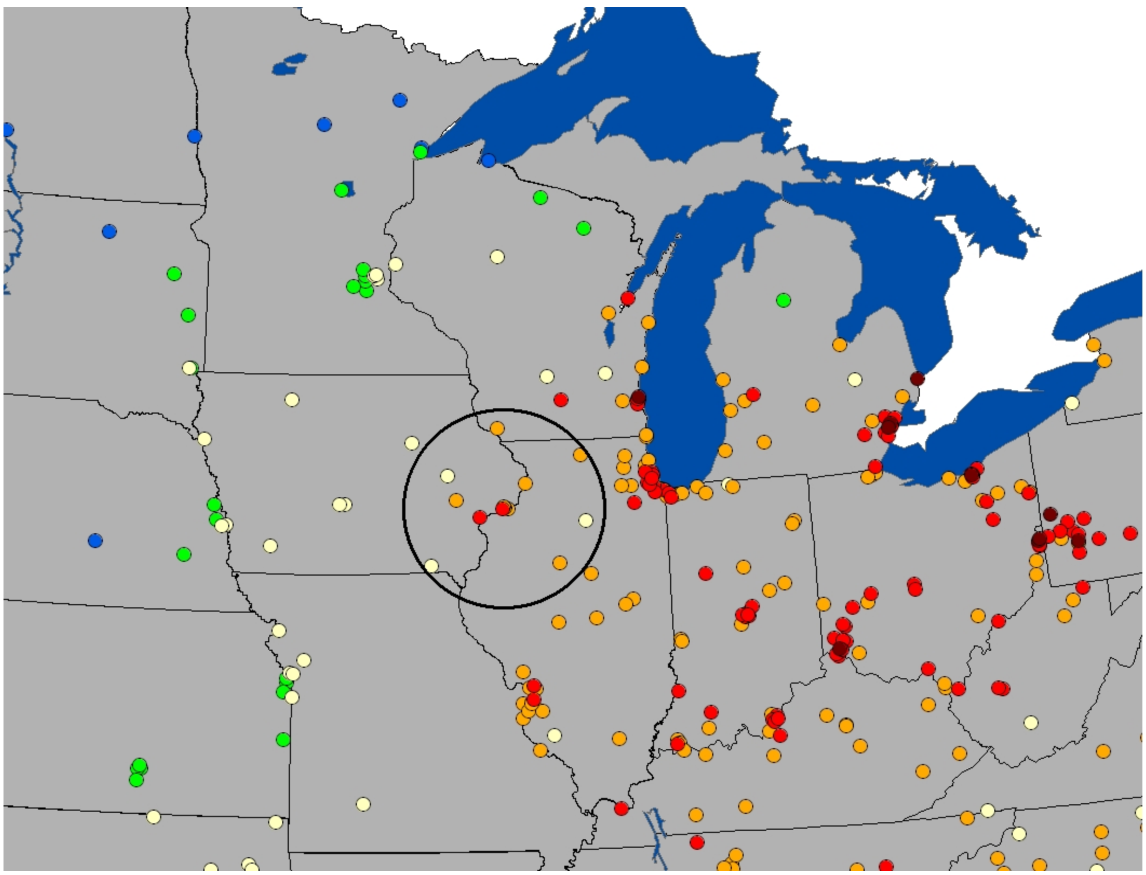

Figure. 1. Monitors "Close To" Violating Monitors Lie Inside Indicated Circle of 100 mile radius.

Table 1.

EPA's Air Quality System Site ID's	
Site ID	**Name**
170990007	Illinois, Oglesby
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191130037	Cedar Rapids, Army Reserve
191390015	Muscatine, Garfield Sch.
191630015	Davenport, Jefferson Sch.
191630018	Davenport, Adams Sch.
191630019	Davenport, BH Foundry
191770006	Keosauqua, Lake Sugema
550430009	Wisconsin, Potoisi High Sch.

Table 2.

Davenport, Black Hawk Foundry: Differences Relative to Other Quad City Monitors on Exceedance Days					
Exceeedance Date	Exceeedance Value	Adams School	Jefferson School	Arsenal Island	Average Difference
02/03/05	40.0	-5.1	-3.0	-5.1	**-4.4**
06/24/05	36.8	-5.4	-6.3	-	**-5.9**
06/27/05	41.7	-4.2	-4.1	-	**-4.2**
08/02/05	50.5	-6.0	-6.5	-4.5	**-5.7**
09/10/05	36.9	-1.6	-1.9	-	**-1.8**
09/13/05	41.2	-	-17.0	-18.1	**-17.6**
12/24/05	35.8	1.0	0.0	3.5	**1.5**
11/25/06	36.2	-0.8	1.8	-16.6	**-5.2**
03/09/07	44.2	-	-2.1	-	**-2.1**
06/16/07	35.6	-	-	-	**-**
07/26/07	36.0	-5.7	-7.9	-	**-6.8**
09/21/07	37.4	-13.2	-13.5	-	**-13.4**
11/19/07	39.1	-	-11.7	-	**-11.7**
11/20/07	38.3	-4.0	-2.5	-13.2	**-6.6**
12/17/07	38.2	-6.3	-9.7	-	**-8.0**
12/19/07	56.8	-	0.4	-	**0.4**
12/20/07	47.5	-1.5	-2.2	-1.6	**-1.8**
Average	**40.7**	**-4.4**	**-5.4**	**-7.9**	**-5.9**

Concentrations and Differences are Expressed in μg/m^3.

Table 3.

Davenport, Black Hawk Foundry: Differences Relative to Nearby Monitors on Exceedance Days

Exceeedance Date	Exceeedance Value	Clinton, Rainbow Park	Iowa City, Hoover Sch.	Cedar Rapids, Army Reserve	Muscatine, Garfield Sch.	Davenport, Jefferson Sch.	Davenport, Adams Sch.	Keosauqua, Lake Sugema	Illinois, Oglesby	Illinois, Peoria	Illinois, Arsenal Island	Illinois, Rockford	Wisconsin, Potoisi High Sch.	Average Difference
02/03/05	40.0	1.2	1.0	-4.6	-4.3	-3.0	-5.1	-12.0	-9.0	-4.9	-5.1	1.9	-0.5	**-3.7**
06/24/05	36.8	-5.8	-3.9	-7.2	-6.2	-6.3	-5.4	-2.4	-7.7	-1.0	-	-	-11.7	**-5.8**
06/27/05	41.7	-2.3	-6.2	-6.8	-4.4	-4.1	-4.2	-10.9	4.5	6.1	-	7.6	-3.1	**-2.2**
08/02/05	50.5	-5.2	-9.3	-9.7	-6.9	-6.5	-6.0	-14.9	-	-6.8	-4.5	-4.0	-9.7	**-7.6**
09/10/05	36.9	-1.6	-4.4	-2.5	-3.3	-1.9	-1.6	-7.0	-4.8	-5.1	-	-	-	**-3.6**
09/13/05	41.2	-16.9	-18.5	-19.7	-18.1	-17.0	-	-	-14.1	-12.9	-18.1	-16.6	-	**-16.9**
12/24/05	35.8	0.8	-6.2	-9.6	-2.0	0.0	1.0	-15.0	-	-7.3	3.5	-17.6	-0.8	**-4.8**
11/25/06	36.2	14.5	0.5	0.6	-3.7	1.8	-0.8	-10.5	-12.4	-11.4	-16.6	-3.0	5.0	**-3.0**
03/09/07	44.2	-6.9	-2.3	-	-2.7	-2.1	-	-	-	-	-	-	-	**-3.5**
06/16/07	35.6	-6.0	-2.8	-	-3.8	-	-	-	-	-	-	-	-	**-4.2**
07/26/07	36.0	-5.5	-7.3	-10.1	-3.7	-7.9	-5.7	-	-6.8	-1.7	-	-7.4	-9.6	**-6.6**
09/21/07	37.4	-10.5	-15.2	-17.5	-15.4	-13.5	-13.2	-15.5	-6.5	-2.5	-	-14.7	-19.0	**-13.0**
11/19/07	39.1	-13.0	-13.5	-	-13.6	-11.7	-	-	-	-	-	-	-	**-13.0**
11/20/07	38.3	-5.8	-1.4	-13.0	-10.8	-2.5	-4.0	-21.8	-14.4	-18.0	-13.2	-	-1.9	**-9.7**
12/17/07	38.2	-6.2	-	-8.2	-	-9.7	-6.3	-16.6	-	-1.0	-	-11.5	-5.5	**-8.1**
12/19/07	56.8	-	-2.0	-	-1.9	0.4	-	-	-	-	-	-	-	**-1.2**
12/20/07	47.5	-	-0.1	5.9	0.1	-2.2	-1.5	-21.1	-14.5	-15.0	-1.6	-5.1	-1.6	**-5.2**
Average	**40.7**	**-4.6**	**-5.7**	**-7.9**	**-6.3**	**-5.4**	**-4.4**	**-13.4**	**-8.6**	**-6.3**	**-7.9**	**-7.0**	**-5.3**	**-6.6**

Concentrations and Differences are Expressed in µg/m³.

Table 4.

Muscatine, Garfield School: Differences Relative to Nearby Monitors on Exceedance Days

Exceeedance Date	Exceeedance Value	Clinton, Rainbow Park	Iowa City, Hoover Sch.	Cedar Rapids, Army Reserve	Davenport, Jefferson Sch.	Davenport, Adams Sch.	Davenport, BH Foundry	Keosauqua, Lake Sugema	Illinois, Oglesby	Illinois, Peoria	Illinois, Arsenal Island	Illinois, Rockford	Wisconsin, Potoisi High Sch.	Average Difference
1/31/05	36.6	-3.0	11.0	8.4	-5.9	-5.7	-3.5	-3.7	-3.8	-5.5	-	-	1.0	**-1.1**
2/3/05	35.7	5.5	5.3	-0.3	1.3	-0.8	4.3	-7.7	-4.7	-0.6	-0.8	6.2	3.8	**1.0**
6/27/05	37.3	2.1	-1.8	-2.4	0.3	0.2	4.4	-6.5	8.9	10.5	-	12.0	1.3	**2.6**
8/2/05	43.6	1.7	-2.4	-2.8	0.4	0.9	6.9	-8.0	-	0.1	2.4	2.9	-2.8	**-0.1**
12/21/05	36.8	2.9	2.3	-4.1	-5.4	-25.7	-4.1	-	-	-4.3	-	-	-5.1	**-5.4**
2/23/07	44.0	-35.1	-34.8	-34.5	-34.5	-35.0	-33.4	-28.6	-35.7	-31.0	-33.7	-37.6	-36.5	**-34.2**
2/24/07	53.2	-44.6	-42.3	-	-44.1	-44.2	-43.2	-	-43.2	-	-	-	-	**-43.6**
2/28/07	54.7	-33.9	-35.3	-	-35.6	-	-	-	-	-	-	-	-	**-34.9**
3/9/07	41.5	-4.2	0.4	-	0.6	-	2.7	-	-	-	-	-	-	**-0.1**
5/3/07	42.2	-34.0	-32.9	-32.0	-33.1	-34.2	-33.3	-25.2	-34.4	-	-33.1	-35.7	-30.4	**-32.6**
5/4/07	61.0	-45.4	-41.8	-	-46.0	-	-44.9	-	-	-43.4	-	-	-	**-44.3**
5/5/07	63.2	-41.5	-36.7	-	-39.9	-	-39.9	-	-	-	-	-	-	**-39.5**
12/19/07	54.9	-	-0.1	-	2.3	-	1.9	-	-	-	-	-	-	**1.4**
12/20/07	47.6	-	-0.2	5.8	-2.3	-1.6	-0.1	-21.2	-14.6	-15.1	-1.7	-5.2	-1.7	**-5.3**
Average	**46.6**	**-19.1**	**-15.0**	**-7.7**	**-17.3**	**-16.2**	**-14.0**	**-14.4**	**-18.2**	**-11.2**	**-13.4**	**-9.6**	**-8.8**	**-16.9**

Concentrations and Differences are Expressed in $\mu g/m^3$.

Appendix H. Histograms of Concentration Differences

Design Values are calculated from federal reference method (FRM) data gathered during the period of 2005 to 2007. Design values are as reported from the EPA document, available on line at:

http://www.epa.gov/airtrends/pdfs/final%202005-2007%20PM2.5%20design%20values%20AQS%2008jul08.xls

Only sites with complete data or complete data after substitution ("A" and "NA") are included.

The data used for exceedance days at Blackhawk Foundry and exceedance days at Garfield School were retrieved from EPA's Air Quality System (AQS) in October 2008. Concentrations are expressed in micrograms of particulate, per cubic meter of air at local conditions (µg/m[3]).

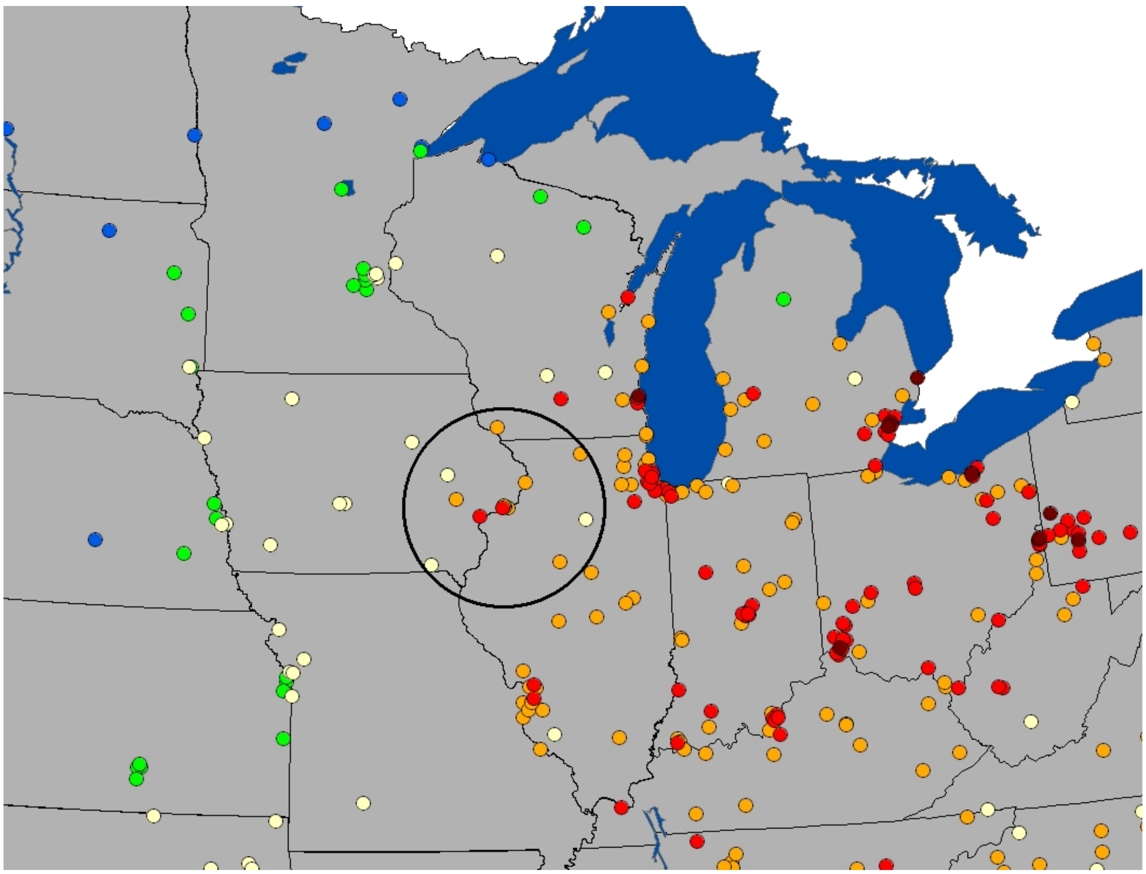
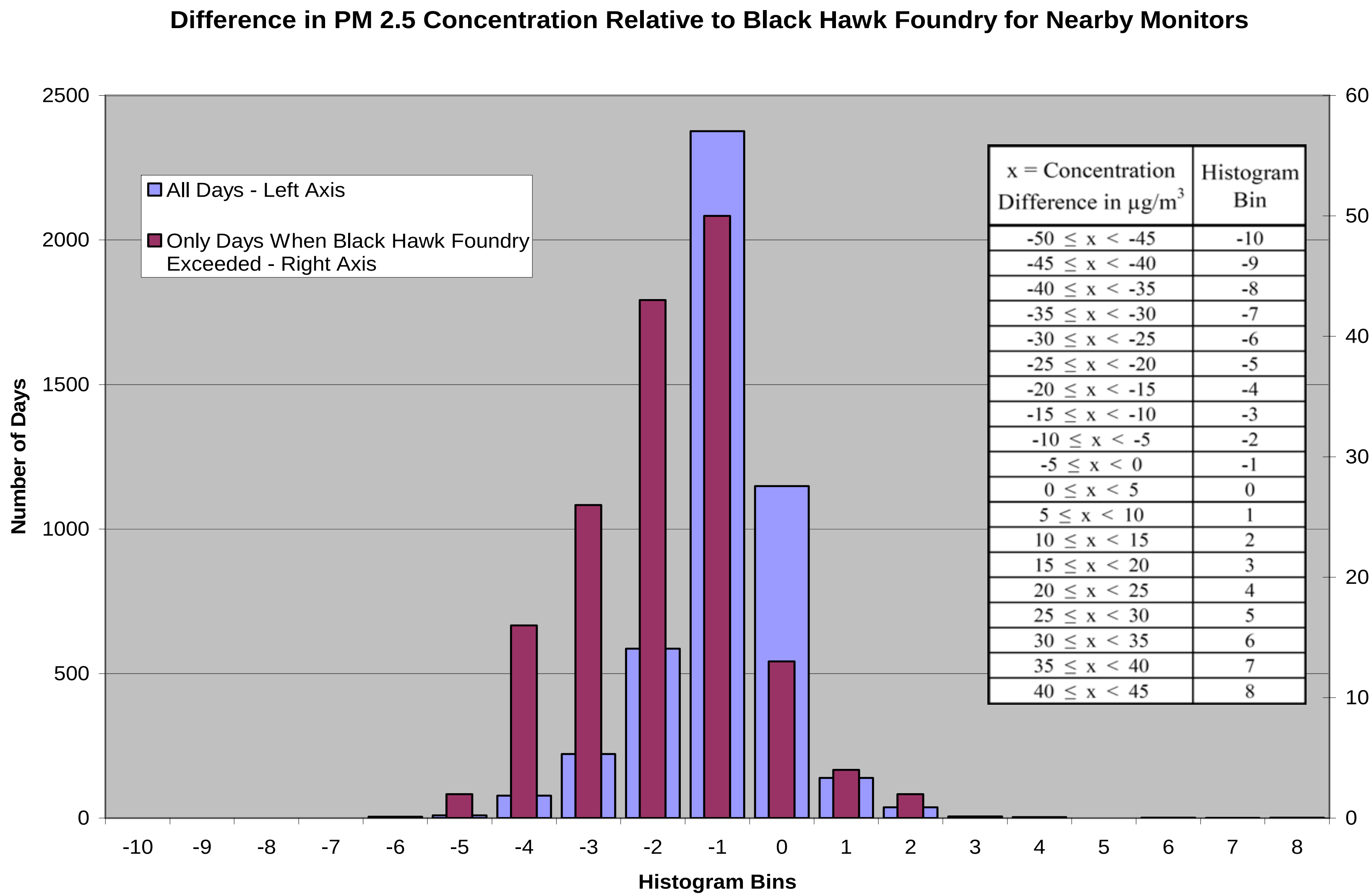


Figure 1. Monitors "Close To" Violating Monitors Lie Inside Indicated Circle of 100 mile radius.

Table 1.

EPA's Air Quality System Site ID's	
Site ID	**Name**
170990007	Illinois, Oglesby
171430037	Illinois, Peoria
171613002	Illinois, Arsenal Island
172010013	Illinois, Rockford
190450021	Clinton, Rainbow Park
191032001	Iowa City, Hoover Sch.
191130037	Cedar Rapids, Army Reserve
191390015	Muscatine, Garfield Sch.
191630015	Davenport, Jefferson Sch.
191630018	Davenport, Adams Sch.
191630019	Davenport, BH Foundry
191770006	Keosauqua, Lake Sugema
550430009	Wisconsin, Potoisi High Sch.



x = Concentration Difference in μg/m^3	Histogram Bin
$-50 \le x < -45$	-10
$-45 \le x < -40$	-9
$-40 \le x < -35$	-8
$-35 \le x < -30$	-7
$-30 \le x < -25$	-6
$-25 \le x < -20$	-5
$-20 \le x < -15$	-4
$-15 \le x < -10$	-3
$-10 \le x < -5$	-2
$-5 \le x < 0$	-1
$0 \le x < 5$	0
$5 \le x < 10$	1
$10 \le x < 15$	2
$15 \le x < 20$	3
$20 \le x < 25$	4
$25 \le x < 30$	5
$30 \le x < 35$	6
$35 \le x < 40$	7
$40 \le x < 45$	8

Figure 2. Nearby monitors means those $PM_{2.5}$ FRM monitors with Design Values that are within a 100 mile radius of the Quad Cities.

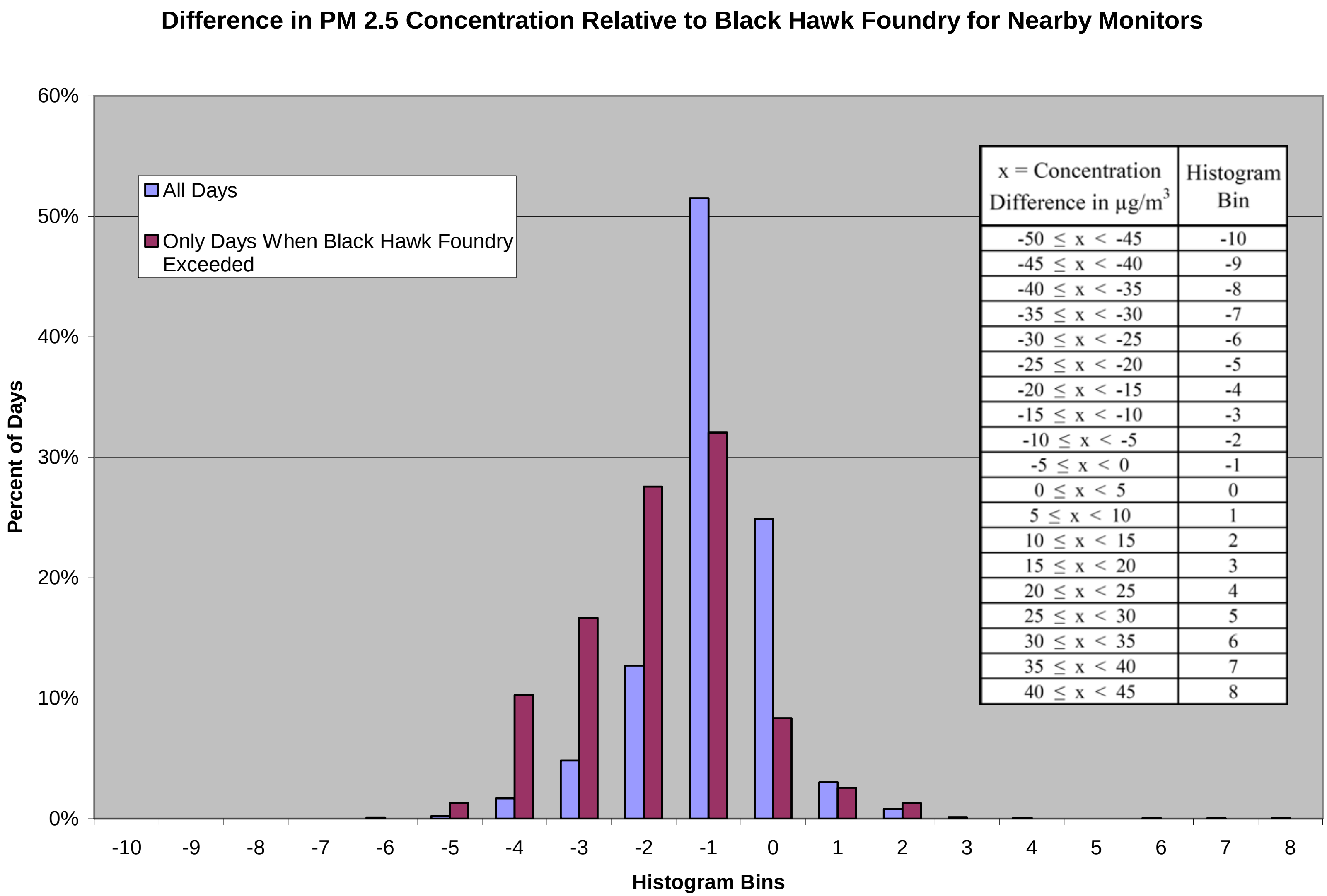
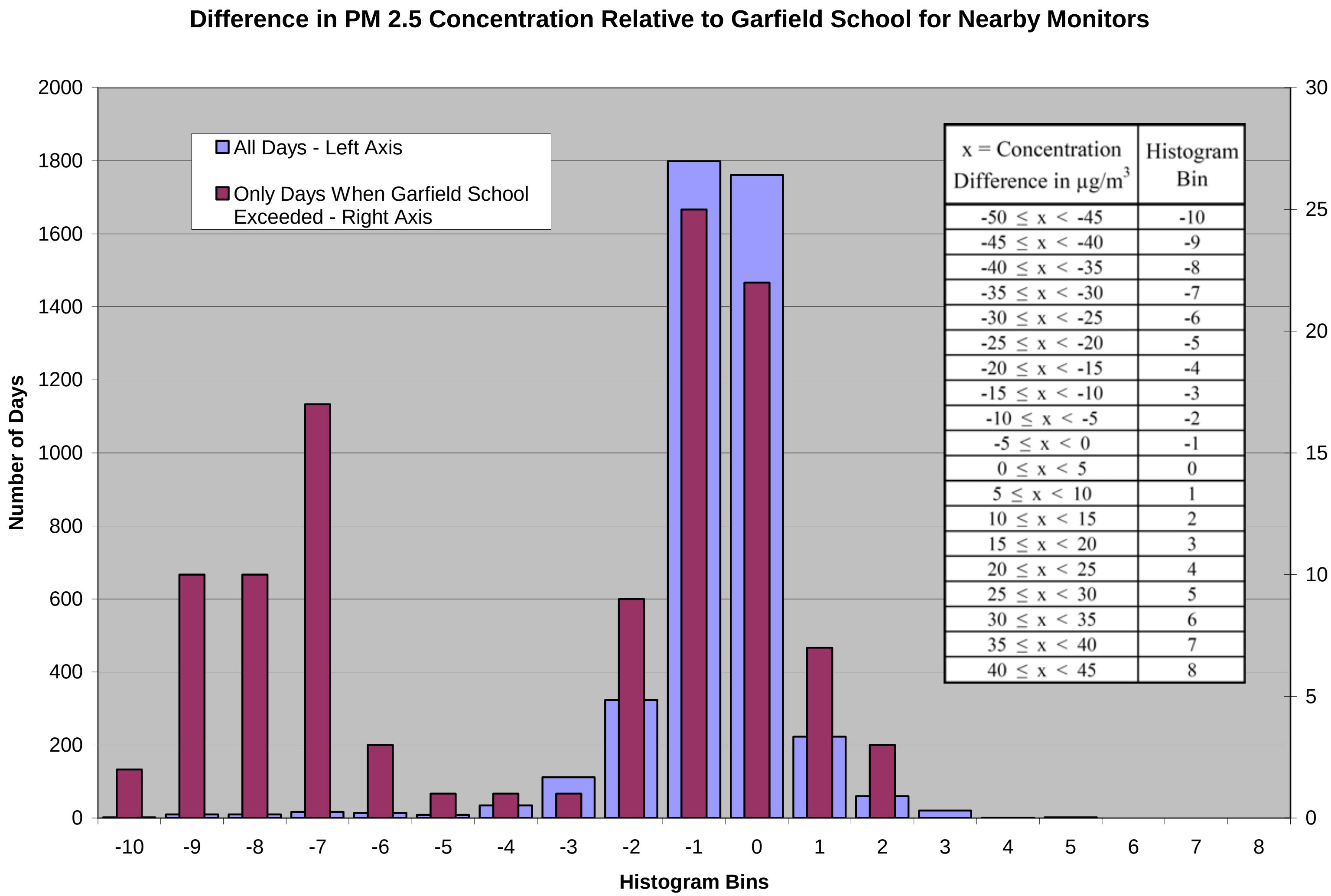


Figure 3. “Nearby monitors” means those $PM_{2.5}$ FRM monitors with Design Values that are within a 100 mile radius of the Quad Cities.



x = Concentration Difference in $\mu g/m^3$	Histogram Bin
$-50 \leq x < -45$	-10
$-45 \leq x < -40$	-9
$-40 \leq x < -35$	-8
$-35 \leq x < -30$	-7
$-30 \leq x < -25$	-6
$-25 \leq x < -20$	-5
$-20 \leq x < -15$	-4
$-15 \leq x < -10$	-3
$-10 \leq x < -5$	-2
$-5 \leq x < 0$	-1
$0 \leq x < 5$	0
$5 \leq x < 10$	1
$10 \leq x < 15$	2
$15 \leq x < 20$	3
$20 \leq x < 25$	4
$25 \leq x < 30$	5
$30 \leq x < 35$	6
$35 \leq x < 40$	7
$40 \leq x < 45$	8

Figure 4.” Nearby monitors” means those $PM_{2.5}$ FRM monitors with Design Values that are within a 100 mile radius of the Quad Cities.

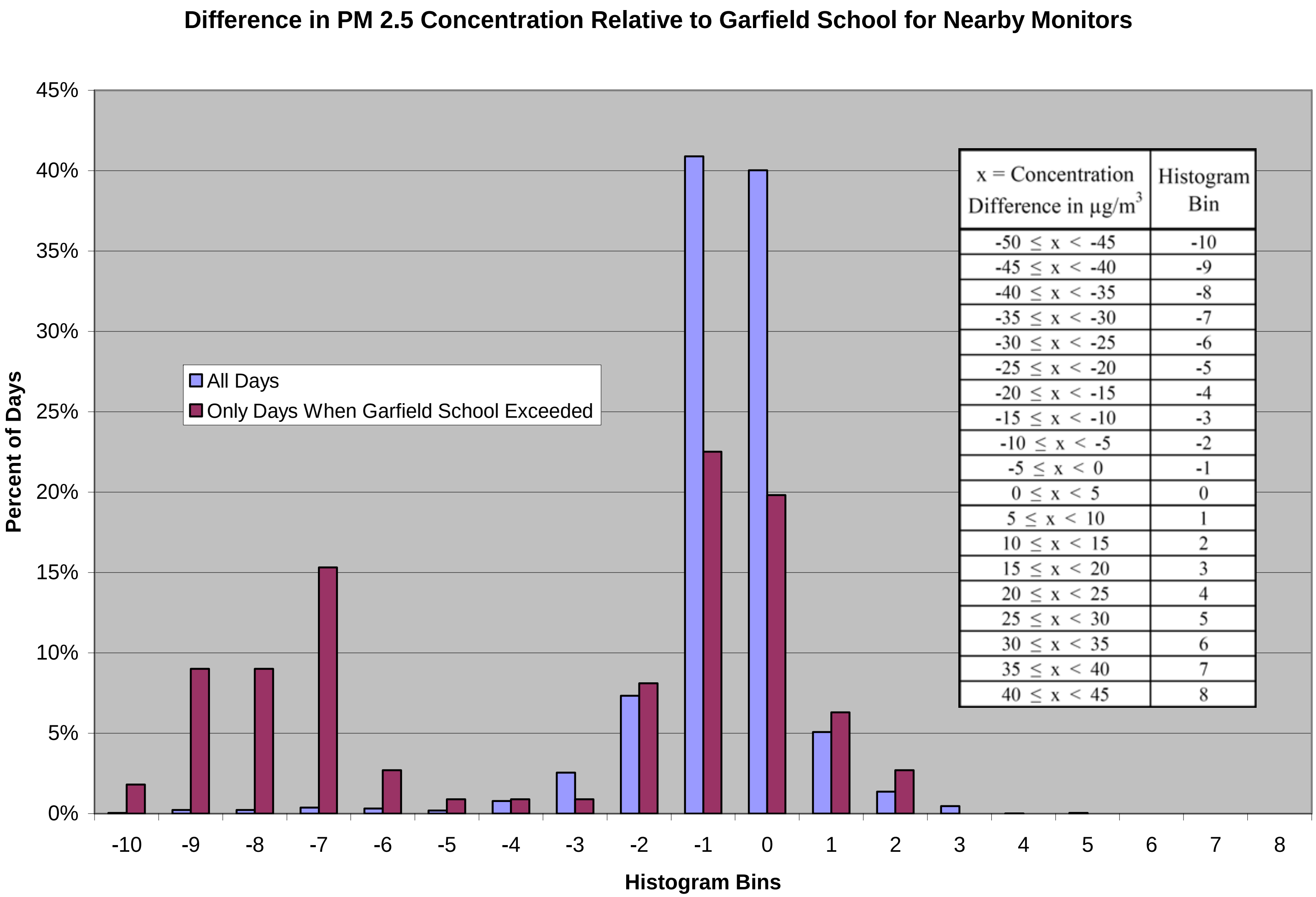


Figure 5. Nearby monitors means those $PM_{2.5}$ FRM monitors with Design Values that are within a 100 mile radius of the Quad Cities.

Appendix I. Ion Speciation Data from FRM Filters

EPA suggested that the weight of evidence for Iowa's claim that the violating areas near Davenport, Blackhawk Foundry and Muscatine, Garfield School are demarcated by ambient impacts from the local sources would be increased if Iowa could show that analysis of archived FRM filters at the exceeding monitors showed evidence of emissions from nearby local sources, even if the impact of these sources could not be quantified.

EPA suggested that Iowa perform an exploratory analysis on archived FRM filters from several sites in Eastern Iowa. The analysis described would involve data collected during the period 2005-2007 utilizing two different analytical protocols (XRF and ion chromatography) with analysis performed by the national chemical speciation laboratory (Research Triangle Institute). The analysis would include filters from the two violating FRM monitors, FRM samplers collocated with speciation samplers at Davenport and Lake Sugema, and a fifth monitoring site in the vicinity of the violating monitors chosen by Iowa. The scope of analytical work was to be limited to approximately 60 FRM filters.

Archived Federal Reference Method (FRM) filters were selected for ion analysis from four high pollution days in Eastern Iowa. Two of the days chosen were regional episodes where $PM_{2.5}$ was measured at elevated levels over a large area. One day each was chosen where $PM_{2.5}$ was measured at exceedance levels at Davenport, Blackhawk Foundry and at Muscatine, Garfield School.

The inclusion of archived FRM filters from monitors collocated with Speciation Trends Network (STN) and Interagency Monitoring for the Protection of Visual Environments (IMPROVE) monitors allowed the comparison of ion results obtained from archived FRM filters to be compared with the speciation results obtained from the STN or IMPROVE samplers. A summary of the comparison results in included in Table 1 below.

Comparison of ion data measured on archived FRM filters with ion data measured from speciation samplers did not demonstrate that the ion results from the FRM filters were reliable.

Modeled data refers to SANDWICH modeled FRM component data available on EPA's AirExplorer website: http://www.epa.gov/airexplorer/

FRM speciation data used in this appendix is available from the Iowa DNR—Air Quality Bureau. Some of the data used in this appendix was developed from speciation analysis that is not available in AQS.

Data used in this appendix may be requested from the Iowa DNR Ambient Monitoring Group.

This appendix refers to some monitor sites by their common names. Sites included in this appendix are:

EPA Site Id	City	County	Site Name	Alternate Name
191630015	Davenport	Scott	Davenport, Jefferson School	10th and Vine
191770006	Keosauqua	Van Buren	Keosauqua, Lake Sugema	Lake Sugema

Table 1. Comparison of Ion Analysis from FRM and Speciation Samplers

FRM Speciation Results (μg/m³)

Site Name	Date	SO4	NO3	NH4
10th & Vine	02/23/07	1.9	0.3	0.8
Lake Sugema	02/23/07	2.1	5.8	2.9
Lake Sugema	09/21/07	6.8	0.0	2.8
10th & Vine	09/21/07	8.0	0.1	3.5
Lake Sugema	11/20/07	4.9	0.7	2.3
10th & Vine	12/20/07	4.7	21.0	10.2
	Average	4.7	4.7	3.7

Speciation Sampler Results and Calcuations (μg/m³)

Site Name	Date	SO4	Teflon NO3 (modeled)	Teflon NH4 (modeled)
10th & Vine	02/23/07	1.9	2.7	1.5
Lake Sugema	02/23/07	1.8	5.5	-
Lake Sugema	09/21/07	6.5	0.0	-
10th & Vine	09/21/07	7.4	0.0	2.8
Lake Sugema	11/20/07	4.7	2.5	-
10th & Vine	12/20/07	4.1	19.1	7.1
	Average	4.4	5.0	3.8

Relative Percent Difference, Zeros Excluded

Site Name	Date	SO4	NO3	NH4
10th & Vine	02/23/07	-0.7%	-153.6%	-65.6%
Lake Sugema	02/23/07	17.6%	5.8%	-
Lake Sugema	09/21/07	5.6%	-	-
10th & Vine	09/21/07	6.8%	-	21.7%
Lake Sugema	11/20/07	6.2%	-110.6%	-
10th & Vine	12/20/07	13.4%	9.6%	36.8%
	Average	8.2%	-62.2%	-2.4%
	Minimum	-0.7%	-153.6%	-65.6%
	Maximum	17.6%	9.6%	36.8%

Absolute Difference (μg/m3)

Site Name	Date	SO4	NO3	NH4
10th & Vine	02/23/07	0.0	-2.3	-0.7
Lake Sugema	02/23/07	0.3	0.3	-
Lake Sugema	09/21/07	0.4	0.0	-
10th & Vine	09/21/07	0.5	0.1	0.7
Lake Sugema	11/20/07	0.3	-1.8	-
10th & Vine	12/20/07	0.6	1.9	3.2
	Average	0.4	-0.3	1.0
	Minimum	0.0	-2.3	-0.7
	Maximum	0.6	1.9	3.2

Appendix J. XRF Metals Speciation Data from FRM Filters

EPA suggested that the weight of evidence for Iowa's claim that the violating areas near Davenport, Blackhawk Foundry and Muscatine, Garfield School are demarcated by ambient impacts from the local sources would be increased if Iowa could show that analysis of archived FRM filters at the exceeding monitors showed evidence of emissions from nearby local sources, even if the impact of these sources could not be quantified.

EPA suggested that Iowa perform an exploratory analysis on archived FRM filters from several sites in Eastern Iowa. The analysis described would involve data collected during the period 2005-2007 utilizing two different analytical protocols (XRF and ion chromatography) with analysis performed by the national chemical speciation laboratory (Research Triangle Institute). The analysis would include filters from the two violating FRM monitors, FRM samplers collocated with speciation samplers at Davenport and Lake Sugema, and a fifth monitoring site in the vicinity of the violating monitors chosen by Iowa. The scope of analytical work was to be limited to approximately 60 FRM filters. The object of the XRF analysis was to look for XRF analytes that may be indicative of point source emissions.

Archived Federal Reference Method (FRM) filters were selected for XRF analysis from several high pollution days in Eastern Iowa. Days were chosen where $PM_{2.5}$ was measured at exceedance levels across Eastern Iowa as well as days when local exceedances were measured at either Davenport, Blackhawk Foundry or at Muscatine, Garfield School.

The inclusion of archived FRM filters from sites collocated with Speciation Trends Network (STN) and Interagency Monitoring for the Protection of Visual Environments (IMPROVE) sites allowed the comparison of XRF metals results obtained from archived FRM filters to be compared with the speciation results obtained from the STN or IMPROVE samplers. A summary of the comparison results in included in Table 1 below.

Results from the XRF speciation of the archived FRM filters did not agree well with the results obtained from the speciation samplers. Speciated results from the FRM filters have not been included in this report.

Data used in this appendix is available from the Iowa DNR—Air Quality Bureau. Some of the data used in this appendix was developed from speciation analysis that is not available in AQS.

Data used in this appendix may be requested from the Iowa DNR Ambient Monitoring Group.

This appendix refers to some monitor sites by their common names. Sites included in this appendix are:

EPA Site Id	City	County	Site Name	Alternate Name
191630015	Davenport	Scott	Davenport, Jefferson School	10th and Vine
191770006	Keosauqua	Van Buren	Keosauqua, Lake Sugema	Lake Sugema

Table 1. Comparison of XRF Results from Archived FRM Filters to Speciation Results

Speciation Sampler Results (ng/m³)

Date	Site	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Magnesium	Titanium	Vanadium	Silicon	Crustal
2/3/2005	Lake Sugema	25.2	0.4	0.0	1.0	34.6	4.1	3.1	0.0	1.7	0.4	56.5	338.7
2/3/2005	10th & Vine	82.8	2.6	0.0	15.2	275.0	20.9	18.1	3.1	7.7	4.1	22.1	897.8
6/27/2005	Lake Sugema	125.5	0.2	0.0	1.5	48.2	2.9	1.8	0.0	4.7	0.0	240.3	1226.6
6/27/2005	10th & Vine	132.0	3.0	0.7	5.6	94.4	8.0	3.4	0.0	15.6	2.6	0.0	473.9
8/2/2005	Lake Sugema	152.4	0.2	0.0	1.4	57.0	4.0	2.0	29.8	6.5	0.0	280.6	1445.5
8/2/2005	10th & Vine	98.0	2.4	0.0	0.7	69.9	6.2	4.0	0.0	8.2	1.3	0.0	344.7
9/13/2005	10th & Vine	115.0	2.5	0.6	6.0	122.0	6.0	4.5	0.0	16.0	4.1	0.0	513.7
11/25/2006	Lake Sugema	180.4	0.1	0.0	1.4	41.6	6.5	1.6	0.0	3.4	1.2	122.4	858.0
11/25/2006	10th & Vine	88.6	2.6	0.0	8.0	95.5	17.7	3.1	50.6	0.0	4.5	77.1	663.1
5/3/2007	10th & Vine	52.4	0.3	0.0	3.7	96.3	4.8	7.8	12.7	3.2	0.0	69.6	584.2
7/26/2007	10th & Vine	240.0	0.2	0.0	4.7	88.4	11.3	8.5	4.8	4.8	0.9	140.0	1136.6
	Average	117.5	1.3	0.1	4.5	93.0	8.4	5.3	9.2	6.5	1.7	91.7	771.2

FRM Speciation Results (ng/m³)

Date	Site	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Magnesium	Titanium	Vanadium	Silicon	Crustal
2/3/05	Lake Sugema	20.4	0.0	0.0	0.5	34.7	2.7	2.1	0.1	3.5	0.0	25.5	219.1
2/3/05	10th & Vine	69.5	2.0	1.2	11.9	211.2	15.1	15.1	5.9	1.6	0.2	97.4	990.7
6/27/05	Lake Sugema	116.9	0.0	0.3	0.9	45.5	0.8	1.3	8.0	3.5	0.0	141.8	836.5
6/27/05	10th & Vine	95.8	1.0	1.3	3.9	67.6	7.2	1.1	10.4	4.1	0.8	105.5	720.9
8/2/05	Lake Sugema	150.5	0.8	0.2	1.9	58.0	1.7	1.8	3.2	4.8	0.0	121.5	848.2
8/2/05	10th & Vine	80.6	0.2	0.1	1.4	61.2	6.1	2.0	0.0	4.8	0.0	93.7	638.2
9/13/05	10th & Vine	73.8	0.6	1.1	4.5	83.7	5.3	1.4	5.5	3.8	1.1	127.4	805.5
11/25/06	Lake Sugema	149.2	0.0	0.0	1.4	38.0	4.9	1.4	6.7	1.9	1.1	82.6	647.2
11/25/06	10th & Vine	68.8	1.2	0.8	4.6	73.7	10.5	1.2	0.0	0.4	0.0	55.8	499.5
5/3/07	10th & Vine	61.0	0.6	1.1	3.8	106.6	3.0	7.9	3.5	1.7	0.0	100.0	733.7
7/26/07	10th & Vine	213.6	0.4	0.7	4.5	94.7	11.9	9.6	8.9	3.7	1.1	170.0	1218.6
	Average	100.0	0.6	0.6	3.6	79.5	6.3	4.1	4.7	3.1	0.4	101.9	741.6

% Relative Difference (zero's excluded)

Date	Site	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Magnesium	Titanium	Vanadium	Silicon	Crustal
2/3/05	Lake Sugema	21%	-	-	66%	0%	42%	41%	-	-72%	-	76%	43%
2/3/05	10th & Vine	17%	23%	-	24%	26%	32%	18%	-62%	131%	178%	-126%	-10%
6/27/05	Lake Sugema	7%	176%	-	56%	6%	117%	33%	-	29%	-	52%	38%
6/27/05	10th & Vine	32%	101%	-53%	37%	33%	12%	99%	-	117%	107%	-	-41%
8/2/05	Lake Sugema	1%	-138%	-	-28%	-2%	79%	14%	162%	30%	-	79%	52%
8/2/05	10th & Vine	19%	165%	-	-68%	13%	0%	68%	-	52%	186%	-	-60%
9/13/05	10th & Vine	44%	123%	-65%	29%	37%	13%	103%	-	124%	116%	-	-44%
11/25/06	Lake Sugema	19%	-	-	-1%	9%	27%	14%	-	56%	9%	39%	28%
11/25/06	10th & Vine	25%	73%	-	54%	26%	51%	88%	-	-	-	32%	28%
5/3/07	10th & Vine	-15%	-69%	-	-4%	-10%	48%	-1%	114%	58%	-	-36%	-23%
7/26/07	10th & Vine	12%	-63%	-	5%	-7%	-5%	-12%	-60%	25%	-24%	-19%	-7%
	Average	**17%**	**43%**	**-59%**	**15%**	**12%**	**38%**	**42%**	**38%**	**55%**	**95%**	**12%**	**0%**
	Min	**-15%**	**-138%**	**-65%**	**-68%**	**-10%**	**-5%**	**-12%**	**-62%**	**-72%**	**-24%**	**-126%**	**-60%**
	Max	**44%**	**176%**	**-53%**	**66%**	**37%**	**117%**	**103%**	**162%**	**131%**	**186%**	**79%**	**52%**

Appendix K. Regional Modeling Plan

Utilizing Regional Modeling Techniques to Investigate Local Emissions Influences upon $PM_{2.5}$ Concentrations

In a letter dated 18 August 2008, the U.S. EPA Region VII office proposed to declare Scott County, IA and Rock Island County, IL as a single nonattainment area based upon the 2005-2007 24-hour $PM_{2.5}$ design value for the source-oriented FRM monitor known as the Blackhawk Foundry monitor. In the same letter, U.S EPA Region VII proposed the Muscatine County border as the appropriate nonattainment boundary for a monitor located at Garfield Elementary school in Muscatine County, IA.

The Iowa Department of Natural Resources (IDNR) believes the size and scope of the boundaries are unreasonably large and that smaller boundaries are appropriate. The inclusion of Rock Island County within a nonattainment area associated with the Blackhawk Foundry monitor is unwarranted. Arguments provided by U.S. EPA Region VII in support of their proposed boundaries discuss possible contributions from sources not adjacent to the violating monitors. EPA has stated "Iowa has not provided sufficient information to show what portion of the $PM_{2.5}$ contribution to the violating monitor…is attributable to the nearby source. Nor has sufficient information been provided to explain the contribution from other metro area sources and from longer range transport." Also, EPA states that "$PM_{2.5}$ precursor emissions of SO2 and NOx in the counties need to be analyzed further to determine whether other sources of pollutants are contributing to exceedance events." However, the converse is also true, as EPA Region VII has provided no evidence which demonstrates emissions in Rock Island County are contributing to the NAAQS violation in Scott County.

To address these issues, the IDNR is proposing to investigate source contributions to particulate matter concentrations in Scott County and potentially Muscatine County using the regional scale photochemical grid model CAMx. Given comments on EPA's recommendations are due October 20^{th} and regional modeling applications require intensive computational and personnel commitments, project goals are constrained and must be prioritized and designed to accommodate EPA's timeline. Realizing timelines are short, EPA Region VII has offered the expertise and computational resources of their regional modeler, Bret Anderson.

<u>IDNR Modeling Plans</u>

The constrained timeline and the scientific design of CAMx dictate that the first-order regional modeling analysis focus upon the $PM_{2.5}$ contributions at the county-level scale. The first phase of the IDNR study will provide a quantification of the particulate matter concentrations in Scott County attributable to the emissions in Rock Island County, IL. This analysis will be completed through a zero-out sensitivity analysis using the2005 BaseM (Round 3) SIP quality modeling databases developed by LADCO. The IDNR has developed a 12 km domain encompassing Iowa and extending into western Illinois to utilize the 12 km emissions data available from LADCO, while saving resources by windowing the default LADCO 12 km domain. The meteorology will be flexi-nested from the 36 km domain. Flexi-nesting the meteorology is necessary in order to complete the project on time and is not expected to compromise results given the relatively simple topography found within the 12 km domain.

All elevated point source emissions in Rock Island County will be zeroed. Additionally, all other emissions (e.g. area, onroad, offroad, marine-aircraft-locomotive, low-point, and biogenic) will be zeroed in the 12 km grid cells over Rock Island County. If additional time was available, the biogenic component emissions would be processed separately from the anthropogenic emissions and would remain identical to their basecase emission rates. No significant artifacts are expected from this caveat. In order to evaluate the impacts of zeroing the emissions in Rock Island County, a basecase simulation (which includes all emissions from Rock Island County) will be completed. The differences in $PM_{2.5}$ concentrations (prioritizing results in Scott County) between these two simulations will then be identified and quantified. These procedures, which are far more robust than EPA's Composite Emissions Score, will provide a highly informative measure of Rock Island's contributions.

The second phase of the IDNR study will focus upon emissions from within Scott County. Two additional zero-out sensitivity analyses are planned. The initial sensitivity will zero out all emissions in Scott County while the second simulation will focus upon zeroing emissions only in the Quad Cities area. These simulations will help quantify the $PM_{2.5}$ contributions attributable to emissions in Scott County, as well as the metro area. Time permitting, a similar investigation will occur for emissions in Muscatine County. The evaluation for Scott County will be completed prior to a Muscatine County evaluation because Muscatine County lacks a sizeable metropolitan area, fewer sources exist in Muscatine County, and the local source/receptor relationships in Muscatine are even more pronounced than in Scott County.

Modeling at resolutions finer than 12 km cannot be conducted in the time frame allowed. More importantly, regional-scale models are currently not well-suited to assess contributions associated with the very fine source/receptor relationships associated with Blackhawk Foundry/Blackhawk Foundry monitor in Scott County and Grain Processing Corporation/Garfield Elementary school monitor in Muscatine County. Dispersion models are capable of quantifying direct $PM_{2.5}$ impacts, in a conservative manner, but currently cannot account for chemistry. The methods outlined above represent the best methods currently available to address the contributions to $PM_{2.5}$ concentrations from metro area and county-wide fine particulate precursors emissions.

Illinois EPA Modeling Plan

The Illinois EPA is planning on investigating the particulate matter contributions in Scott County attributable to emissions sources in Rock Island County, IL. AERMOD dispersion modeling and CAMx photochemical modeling tools will be applied as time allows. AERMOD is suited to analyze near-field transport and the source/receptor relationships associated with directly-emitted fine particulate matter. The dispersion modeling analyses can incorporate and supply information at higher resolution scales than can be resolved by regional models. AERMOD results can be used to assess $PM_{2.5}$ impacts in Scott County from major point sources in Rock Island County. IL EPA is also planning on using the LADCO BaseM meteorology/emissions databases in combination with CAMx to assess Rock Island's impact on $PM_{2.5}$ concentration in Scott County.

U.S. EPA Region VII Modeling Plan

While zero-out modeling is one method of investigating contributions, it is can become computational intensive and time consuming if many sensitivities are required. The CAMX photochemical model offers Particulate Matter Source Apportionment Technology (PSAT) as a sophisticated means of investigating how regions and sources contribute to particulate matter formation at any given receptor. The disadvantage of PSAT is that the computational resource requirements can be demanding, and total run times can easily exceed those needed for a small zero-out sensitivity analysis, such as the one proposed by the IDNR. Bret Anderson has offered to implement a PSAT simulation to compliment the zero-out modeling runs being conducted by the IDNR. EPA Region VII will complete the PSAT simulation and the results will be sent to the IDNR for analysis. The IDNR will analyze the results to the degree that we have time to do so.

EPA R7 will implement PSAT over the CENRAP national 36 km domain and the 12 km domain developed by IDNR. All necessary preprocessing and the model execution will be completed by EPA Region VII. The model configuration, including emissions and meteorology, will be based upon the 2002 Base E CAMx modeling system developed by CENRAP and their contractors for purposes of regional haze. The 12km meteorology will be flexi-nested. The source apportionment techniques will be applied to SO_2, NOx, and primary particulate matter. The IDNR, in consultation with EPA, have identified three primary source regions to assess $PM_{2.5}$ contributions. The three primary source regions will separately track contributions from Rock Island County, IL, Scott County, IA, and Muscatine County, IA. The remaining 97 counties in Iowa will be assigned a separate source region. All other areas in the 12km domain, and areas in the 36 km domain, will be grouped to account for the particulate matter concentrations associated with out-of-state long-range transport. These source regions will provide information necessary to address the contributions associated with county sources, long range transport, and the role of precursor pollutants associated with the NAAQS violations in Scott and Muscatine Counties.

Appendix L. CAMx Model Performance

The strictest form of model evaluation involves pairing modeled predictions with observed data in space and time. A comparison of FRM measurements at 10th and Vine with model predictions from the corresponding 12 km grid cell are shown in Figure 35. In general, an overestimation of the cleanest days occurs. More concerning is the overestimated winter exceedance events, in combination with underpredictions of the higher warm season exceedances. Speciated data reveal that during the exceedance events, winter nitrate concentrations are overestimated while summer sulfate concentrations are underestimated. When comparing modeled data to FRM measurements (as shown in Figure 35) nitrate loss associated with volatilization may be a contributing factor to the winter overestimations. The summer sulfate underprediction may result from Iowa's modeled point source emissions data being grown from 2002, rather than the 2005 NEI. Timeline incompatibilities prohibited LADCO from using the Iowa 2005 NEI data.

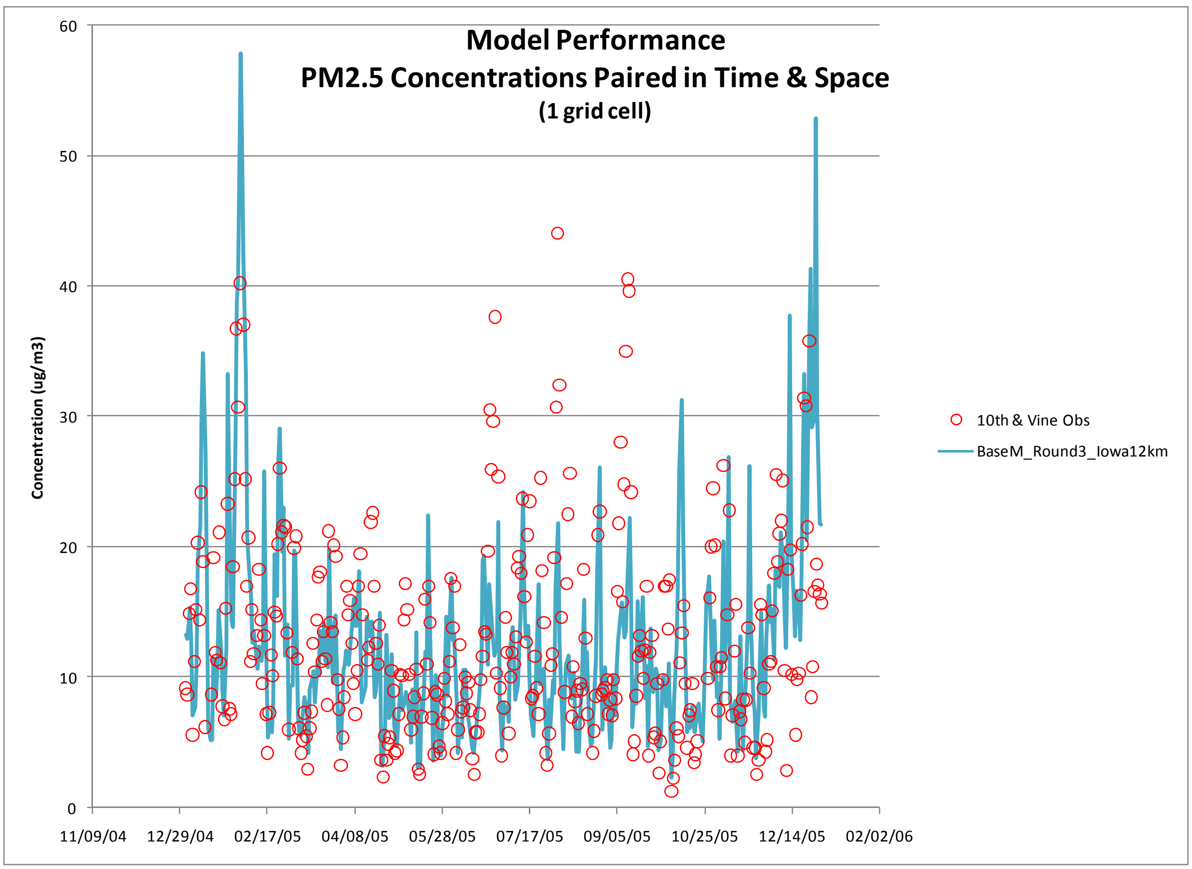


Figure 35. Modeled and predicted $PM_{2.5}$ concentrations. Values are paired in time and space (using only the grid cell containing the monitor, not a 9 grid cell average).

While model performance in Scott County is not ideal, the above comparison is perhaps too rigorous as the chart examines a single point, with predictions and observations of a complex compound paired in space and time. Models are designed to provide only a representation of the atmosphere. Science, data, and computational limitations prohibit perfect model performance. While measurements are a sound indicator of atmospheric conditions, they are not absolute truth and are subject to bias and uncertainty.

The use of fractional error and fraction bias metrics is a common method in photochemical model evaluation to address such limits. Fractional error and bias metrics normalize results to the average of the measured and modeled results. Fractional bias and error have the advantage of treating under and over predictions with equal weight. These fractional metrics are not artificially inflated by errors associated with small measurements, as can occur with normalized error. The fractional bias (and error) metrics are often displayed in terms of a "bugle plot" as discussed in the EPA *"Guidance on the Use of Models and Other Analyses for Demonstration Attainment of Air Quality Goals for Ozone,* $PM_{2.5}$ *and Regional Haze*," April 2007, modeling guidance document.

The daily fractional bias and fractional error results are shown in Figure 36 and Figure 37, respectively. The red lines represent performance metrics developed by Boylan and Russell[10] and referenced in the EPA modeling guidance document. Ideal model performance occurs when errors are confined within the goals represented by the blue lines. The red lines represent the bounds of preferred model performance. The majority of daily metrics are within the goals, yet the underprediction of the summertime elevated concentrations can be seen. Averaging across the entire dataset produces the annual average metric which yields essentially zero bias. The annual average fractional error is about 33%, which is within all goals.

Generally, model performance is gauged against greater spatial or temporal averaging schemes. For example, using monthly averaged results across multi-state areas. While model performance could be improved at Davenport, results from the LADCO analysis, which examines a much broader spatial and array of measurements, reveal acceptable model performance.[11]

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[10] Boylan, J.W. and Russell, A.G, (2006), "PM and Light Extinction Model Performance Metrics, Goals, and Criteria for Three-Dimensional Air Quality Models", *Atmos. Environ*., **40**, 4946-4959.

[11] Detailed discussions of the 2005 BaseM model performance available at: http://ladco.org/Technical_Support_Document.html

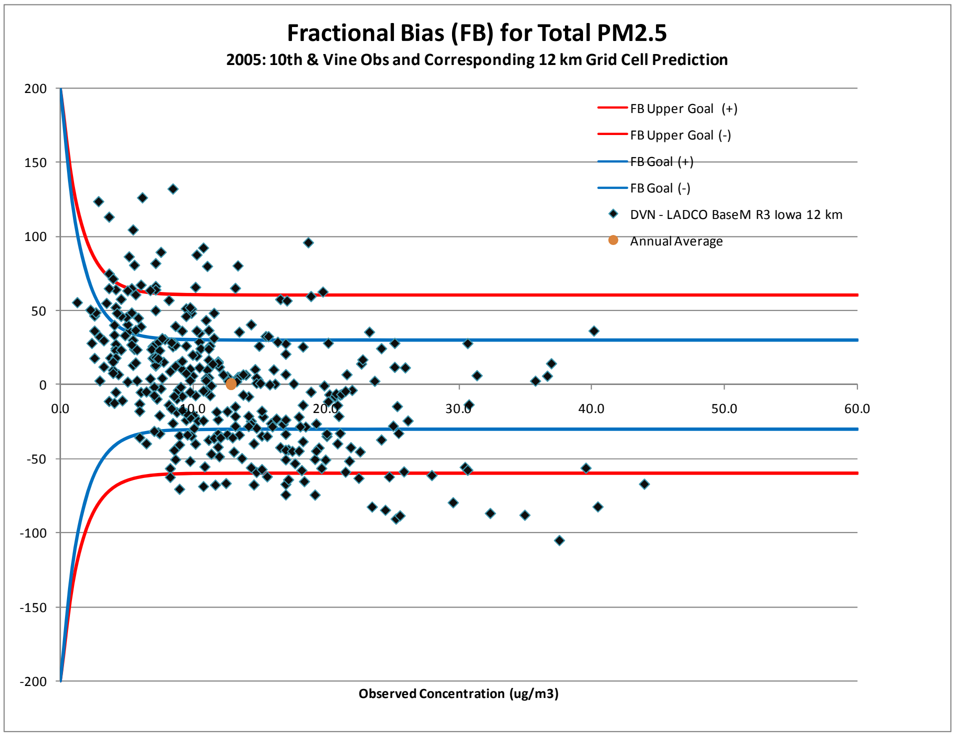

Figure 36. Daily fractional bias values using the 10th and Vine FRM observations and the corresponding 12 km grid cell predictions.

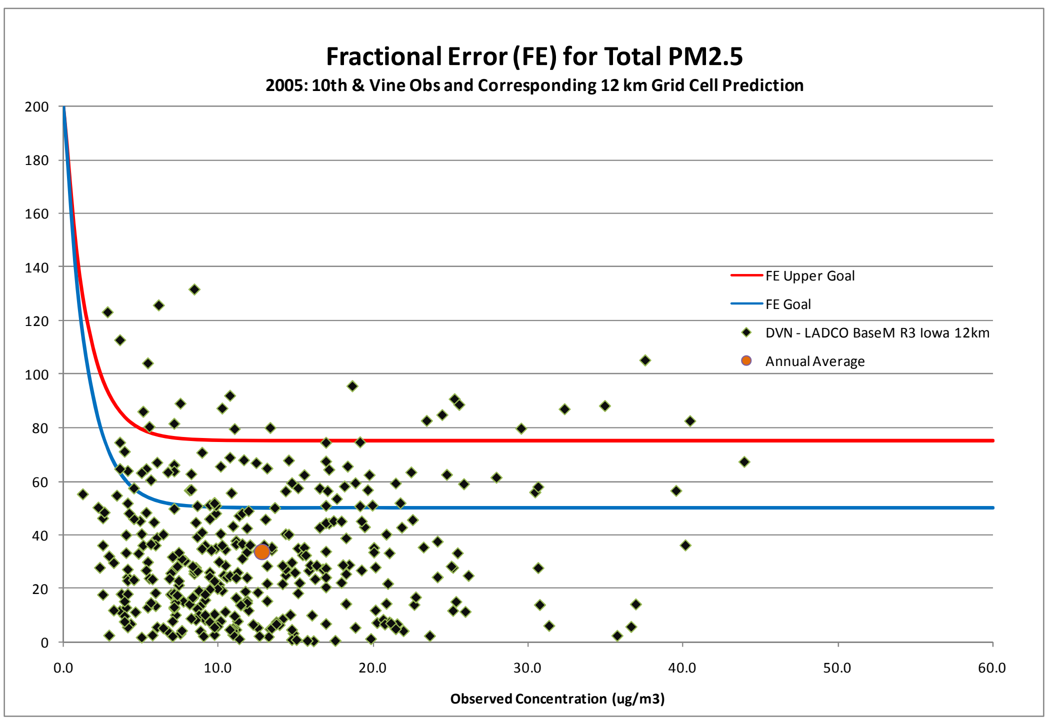

Figure 37. Daily fractional error values using the 10th and Vine FRM observations and the corresponding 12 km grid cell predictions.

Appendix M. $PM_{2.5}$ Emissions Mitigation Plan for Blackhawk Foundry

PM2.5 EMISSIONS MITIGATION PLAN
BLACKHAWK FOUNDRY & MACHINE COMPANY, INC.
323 S. CLARK STREET
DAVENPORT, IOWA

October 10, 2008

Prepared By:

Blackhawk Foundry & Machine Company, Inc.
Davenport, Iowa

BLACKHAWK FOUNDRY AND MACHINE CO.

323 SOUTH CLARK STREET
DAVENPORT, IOWA 52802

P.O. BOX 3527
DAVENPORT, IOWA 52808

GRAY AND NODULAR IRON • CASTINGS

(563) 323-3621 (FAX) 563-323-2105

Davenport, Iowa

October 10, 2008

Iowa Department of Natural Resources
Air Quality Bureau
7900 Hickman Rd., Suite 1
Urbandale, IA 50322

Attn: Mr. Jim McGraw

Re: PM2.5 Emissions Mitigation Plan
Blackhawk Foundry & Machine Company, Inc.
Proposed Facility Modifications

Dear Mr. McGraw:

Blackhawk Foundry & Machine Company, Inc. (Blackhawk) is pleased to submit our Mitigation Plan for the site referenced above. The Plan presents a summary of voluntary measures completed to date and a listing of proposed improvements and implementation schedule to move the region towards compliance with National Ambient Air Quality Standards.

Should you have any questions concerning the contents of this report, or if we may be of further service, please contact us at (563) 323-3621.

Sincerely,
Blackhawk Foundry & Machine Co., Inc.

James R. Grafton
President

cc: Terracon Consultants, Inc.

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TABLES

FIGURES

PM2.5 Emissions Mitigation Plan
Blackhawk Foundry & Machine Company, Inc.
Davenport, Iowa

October 10, 2008

1.0 INTRODUCTION

The Iowa Department of Natural Resources (IDNR) operates a network of ambient air monitoring stations for comparison of air quality parameters to National Ambient Air Quality Standards (NAAQS). A monitoring station located near the intersection of Birchwood Avenue and Redwood Avenue is used to measure the ambient air concentration of particulate matter less than 2.5 microns (PM2.5) and other criteria air pollutants. This PM2.5 monitoring station, positioned approximately 500 feet northeast of the Blackhawk Foundry and Machine Company, Inc. (Blackhawk) facility, is identified as a Special Purpose Monitor (SPM) in the IDNR's Iowa Ambient Air Monitoring 2008 Network Plan (Monitoring Plan). The station is intended to monitor localized ambient air quality resulting from particulate emissions from the Blackhawk facility.

The IDNR also operates a PM2.5 monitoring station at 3029 North Division in Davenport, Iowa. This monitor is identified as a part of the State and Local Air Monitoring Stations (SLAMS) network and is intended to provide long-term regional air quality data. A third station, located at the intersection of 10^{th} and Vine in Davenport, Iowa, is identified as a SPM location for PM2.5.

Based on air monitoring data collected and compiled for calendar years 2005 through 2007, the reported 3-year average, 24-hour Design Value of PM2.5 exceeds the NAAQS of 35 micrograms per cubic meter ($\mu g/m^3$). The reported 3-year average, 24-hour PM2.5 Design Value for the 3029 North Division and 10^{th} and Vine locations did not exceed the NAAQS for the same period possibly indicating that the reported exceedance at the Birchwood and Redwood location may be the result of localized influences. Accordingly, the IDNR has requested that Blackhawk evaluate facility-wide PM2.5 emissions and identify alternatives to reduce PM2.5 emissions

2.0 PM2.5 EVALUTION

2.1 Determination of PM2.5 Emissions

Blackhawk has initiated an evaluation of PM2.5 emissions from its Davenport, Iowa facility. The evaluation consisted of a review of particulate emission sources at the facility and a determination of PM2.5 emissions from each identified particulate source. PM2.5 emissions were estimated using information obtained from AP 42, Fifth Edition, "Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources". Particle size distributions, obtained from AP-42, were used to calculate PM2.5 emission rates based on previously accepted emission rates for particulate matter (PM) and particulate matter less than 10 microns (PM10). If particle size distributions for the specific process were not available, Terracon Consultants, Inc. (Terracon), on behalf of Blackhawk, selected a representative particle size distribution based on similar process characteristics. For instance, aggregate handling distributions were generally selected for sand handling systems within the Blackhawk facility. Terracon submitted preliminary estimates of PM2.5 emissions to the IDNR for review. Based on IDNR comments, Terracon modified the PM2.5 emission calculations. Revised emission calculations have been accepted by the IDNR.

2.2 Baseline PM2.5 Air Dispersion Modeling

Upon acceptance of the PM2.5 emission calculations, Terracon developed a preliminary baseline PM2.5 dispersion model for IDNR review. IDNR comments were incorporated and a final baseline model has been accepted by the IDNR.

Modeling was completed using the American Meteorological Society (AMS)/Environmental Protection Agency (EPA) Regulatory Model (AERMOD) dispersion model, version 07026. Regulatory default options were used and ground level concentrations were calculated. Meteorological data from the Moline airport for calendar years 2000 through 2004 were selected. Source, receptor, and building information were taken from the previously submitted air dispersion model for the Blackhawk Lost Foam Project (IDNR Project No. 06-539).

Results of baseline ambient air dispersion modeling of PM2.5 emissions from the Blackhawk facility predict off-site concentrations as high as 24.58 $\mu g/m^3$. Although this is less than the PM2.5 NAAQS, it does not consider possible background contributions. It is anticipated that PM2.5 background concentrations, once developed by the IDNR, could result in a predicted exceedance of the PM2.5 NAAQS.

2.3 Evaluation of Facility Improvements and PM2.5 Air Dispersion Modeling

Subsequently, Blackhawk identified and evaluated facility modifications in an attempt to reduce off-site impacts of PM2.5 emissions from the facility. Review of PM2.5 emissions at Blackhawk has identified several emission units which contribute significantly to predicted off-site PM2.5 concentrations. These include point sources such as the cupola stack, the mill room stack, and the Sand System Scrubber stack. Also included are fugitive sources such as the Foundry High Bay, and the coke, limestone, scrap iron, and waste sand storage piles. Other factors contributing to off-site PM2.5 concentrations include rain-caps on selected stacks, selected emission factors, and the location of site fencing.

Terracon modeled the effects of possible modifications to the identified sources to determine the effect on predicted ground level PM2.5 concentrations. Each selected alternative was modeled individually to determine the relative impact on predicted PM2.5 concentrations. Based on the results of the source specific modeling, a listing of preferred alternatives was identified and compiled into one dispersion model for final analysis. The results of the final ambient air dispersion modeling of PM2.5 emissions from the Blackhawk facility predict a 5-year average highest 8^{th}-high value of 5.47 $\mu g/m^3$. It is anticipated that PM2.5 background concentrations, once developed by the IDNR, may be on the order of 28 to 30 $\mu g/m^3$. The combination of the predicted concentration and background concentration could result in a predicted exceedance of the PM2.5 NAAQS; however, air dispersion modeling demonstrates that the proposed improvements will significantly reduce PM2.5 concentrations and improve local air quality.

3.0 PROPOSED FACILITY MODIFICATIONS

Based on the results of ambient air dispersion modeling, Blackhawk has identified several facility modifications which, collectively, are expected to achieve compliance with NAAQS. The proposed modifications include:

- Extension of the cupola stack to 160 feet.
- Installation of equipment to capture and control foundry emissions.
- Extension of the mill room stack to 100 feet.
- Extension of the sand system scrubber stack to 100 feet.
- Construction of a shed to enclose stored charge and waste materials.
- Installation of a gate across the abandoned Farragut Avenue ROW.
- Conversion of the permitted natural-gas fired Lost Foam Drying Oven to an electric oven.
- Modeling of the Lost Foam Afterburner without a rain-cap.

Due to time constraints, thorough evaluation of each alternative to determine feasibility has not been completed. Order of magnitude cost opinions have been developed; however, construction cost estimates cannot be developed until feasibility has been fully evaluated and final design of the proposed improvements has been completed. It is understood that selected alternatives may be modified and/or replaced. A summary of each modification, as currently proposed, is presented below.

3.1 Cupola Stack

The existing cupola scrubber stack, at a height of 85 feet (25.91 meters), is well below the formula Good Engineering Practice (GEP) stack height of 147.3 feet (44.91 meters) based on Equation 1 on page 6 of GEP Technical Support Document and the regulatory GEP of 65 meters. Raising the stack to a height of 160 feet would exceed the formula GEP stack height and reduce the effects of building downwash on predicted ground level concentrations. Blackhawk has engaged the services of an engineering firm to evaluate the feasibility of extending the existing stack an additional 75 feet. Alternatively, the stack may have to be completely reconstructed.

3.2 Foundry Emissions

Foundry operations including mold pouring and cooling, sand transfer, and mold making result in fugitive emissions of PM2.5. These emissions are emitted from roof-mounted exhaust fans, windows, doors and other building openings and are modeled as a series of volume sources. To account for the uncertainty in the emissions and the retention of the emissions within the building, particulate emissions are reduced by a correction factor of 95%. Due to the heat generated from pouring operations, PM2.5 emissions tend to rise to a high-bay area centrally located over the pour deck. The high-bay area effectively serves as a hood from which particulate emissions can be captured. Blackhawk proposes to collect particulate emissions from the high-bay area and to install control equipment and a discharge stack. Existing roof-mounted exhaust fans would be eliminated. To conserve energy, Blackhawk may consider returning the control equipment discharge to the foundry as make-up air during winter months.

Control equipment will consist of a cartridge-type collector with a control efficiency on the order of 99%. Preliminary design calculations indicate that an air flow rate of 105,000 cubic feet per minute will be required to effectively capture fugitive emissions from the foundry area. It is anticipated that the control equipment will consist of United Air Specialists Model Nos. SFC 120-5 and SFC 128-4, or equivalent. Catalog cut sheets are attached.

3.3 Existing Stack Heights

The existing mill room and sand system scrubber stacks, at heights of 50 feet and 75 feet, respectively, are well below their respective GEP stack heights. Blackhawk proposes to raise the stacks to a height of 100 feet to reduce ground level concentrations.

3.4 Material Storage Enclosure

Scrap iron, coke, limestone and waste sand are currently stored outdoors on the north side of the facility. During inclement weather, the materials get wet and pick up excess dirt and mud which hinder foundry operations. To reduce fugitive emissions and improve foundry operations, Blackhawk proposes to construct an enclosure over the stored materials. It is anticipated that one 80-foot by 80-foot shed will be required to cover the scrap iron and one 50-foot by 90-foot shed would be required to cover the coke, limestone and waste sand. The enclosures would consist of three walls and a roof. To allow for adequate off-loading of materials, the height of the enclosures would be 40 feet. Although the shed would likely be open on one side, the partial covering and enclosure of the material piles would be expected to reduce emissions.

Based on preliminary discussions with IDNR staff, application of a Building Enclosure Credit (BEC) of 50% to associated emissions was deemed appropriate. Based on final IDNR review comments of the source specific modeling; however, the BEC of 50% would apply only to wind-blown storage pile emissions and not to material handling and transfer emissions. As a result, the relative impact on PM2.5 concentrations is significantly reduced. Unless other controls can be incorporated into a material storage enclosure to reduce material handling and transfer emissions, the construction of a material storage enclosure will not be cost effective. Blackhawk will continue to evaluate the construction of a storage enclosure, but may delete this proposed improvement at a later date.

3.5 Site Fencing

An abandoned portion of Farragut Avenue extends northward onto the Blackhawk property a distance of approximately 160 feet. The existing site fence follows the former right-of-way (ROW) line and places the point of compliance within 70 feet of emission sources. Installation of a gate at the southern end of the abandoned ROW would move the point of compliance further from process emission units.

3.6 Permit Revisions

Permitting of the Lost Foam project included the installation of a natural gas-fired drying oven. After issuance of the permit, Blackhawk chose to replace the natural gas-fired oven with an electric oven. PM2.5 emissions from this source can be eliminated. Permitting of the Lost Foam project included the installation of a rain-cap on the Lost Foam Afterburner (EP231). The afterburner and stack have been installed without a rain-cap or other restrictions. Blackhawk proposes to modify construction and operating permits as necessary to reflect current conditions.

4.0 COST OPINIONS

Blackhawk has developed order of magnitude cost opinions for the proposed alternatives. An order of magnitude cost opinion, completed at the initial stages of a project when minimal information is available, might be expected to be between 70% and 150% of the future cost for the project. A detailed design is required to produce a definitive cost estimate. This type of estimate is typically conducted once a substantial portion of the project design is completed. A definitive cost estimate might be expected to be between 95% and 115% of the actual cost of the project.

It is understood that the scope and design of the proposed improvements may change significantly between now and final implementation. Further rising material prices may significantly impact project costs. As such, revisions including changes in the scope of each improvement and the addition or deletion of proposed improvements may be incorporated into this Mitigation Plan. Based on the current summary of proposed improvements, Blackhawk presents the following order of magnitude cost opinion:

Order of Magnitude Cost Opinion

Proposed Improvement	Cost Opinion
Cupola Stack	$175,000
Foundry Control Equipment	$900,000
Mill Room Stack	$40,000
Sand System Scrubber Stack	$35,000
Material Storage Enclosures	$400,000
Site Fencing	$5,000
Permit Revisions	$5,000
Total	**$1,560,000**

5.0 SCHEDULE OF ACTIVITIES

Blackhawk has initiated activities to evaluate project feasibility and to develop preliminary designs for each proposed improvement. Information collected will be used to produce more definitive cost estimates so that funding alternatives can be more fully evaluated and identified. It is anticipated that the proposed improvements will be implemented in a staged approach to reduce impacts to facility operations and financial resources. Based on the anticipated scope of proposed improvements, the order of magnitude cost opinions, and the expected impacts on PM2.5 concentrations, Blackhawk proposes the following schedule of activities.

Table 5-1 Proposed Implementation Schedule

Activity	Start Date	Completion Date
Submit PM2.5 Mitigation Plan	---	October 9, 2008
Complete Feasibility Studies and Preliminary Design	October 1, 2008	February 1, 2009
Complete Evaluation of Financial and Operation Impacts	February 1, 2009	May 1, 2009
Prepare and Submit Construction Permit Applications	April 1, 2009	July 1, 2009
Complete Phase I Improvements o Site Fencing o Permit Revisions	July 1, 2009	November 1, 2009
Complete Phase II Improvements o Cupola Stack o Mill Room Stack o Sand System Scrubber Stack	October 1, 2009	July 1, 2010
Complete Phase III Improvements o Foundry Control Equipment	October 1, 2010	July 1, 2011
Complete Phase IV Improvements o Material Storage Enclosures	October 1, 2011	July 1, 2012

6.0 PREDICTED IMPACTS

Terracon has modeled the effects of each phase of proposed modifications on predicted ground level PM2.5 concentrations. Modeling was conducted in accordance with previously described procedures and incorporated IDNR review comments. The improvements reduce the predicted 5-year average of the 8th High 24-Hour value by approximately 75% and the 5-year average of the annual average by approximately 68%. The results of the incremental modeling are presented below. A summary of source input parameters for each phase is attached as Table 1. Summaries of the highest 5-year averages of the 8th High 24-Hour and Annual Average values are attached as Table 2 and Table 3.

Table 6-1 Incremental Impacts

Improvements	8th High 24-Hour Predicted Ground Level Concentration	Annual Average Predicted Ground Level Concentration
Current	24.71 $\mu g/m^3$	5.67 $\mu g/m^3$
Phase I	24.59 $\mu g/m^3$	5.01 $\mu g/m^3$
Phase II	20.29 $\mu g/m^3$	4.53 $\mu g/m^3$
Phase III	6.27 $\mu g/m^3$	1.85 $\mu g/m^3$
Phase IV	6.22 $\mu g/m^3$	1.80 $\mu g/m^3$

7.0 OTHER PM2.5 CONTROL STRATEGIES

In addition to the physical facility modifications discussed above, Blackhawk has identified several Best Management Practices (BMPs) to reduce PM2.5 emissions. These BMPs have been implemented or will be implemented immediately. The following BMPs have been identified to date:

- Engines of mobile equipment and transport vehicles will be shut off when equipment and vehicles are not in operation. This will include transport vehicles at the shipping and receiving docks, fork trucks, waste hauling vehicles, and end-loaders. Vehicles delivering materials including scrap iron, coke, limestone, or core sand will not be shut off as these vehicles are generally on-site for brief periods and need the engines to operate on-board unloading systems.

- Waste slag from the slag quench operation will be periodically dumped on the surface of the waste sand pile to add moisture to the waste sand and to reduce the exposed surface area, thereby reducing windblown emissions.

- An access door will be added to allow for periodic inspection, cleaning, and maintenance of the cupola orifice ring.

- Blackhawk has modified the cupola charge door to improve the draft into the cupola and reduce turbulence, thereby reducing puff emissions during cupola charging.

- Paved surfaces within the material storage yard will be swept to remove dust accumulations and reduce traffic related emissions.

Blackhawk will continue to identify and evaluate other BMPs, such as the use of dust control measures in unpaved material storage yard areas, to control PM2.5 emissions.

8.0 COMMENTS

Blackhawk has voluntarily initiated an evaluation of facility-wide PM2.5 emissions in an attempt to identify facility modifications that may reduce predicted and actual ground-level concentrations. Blackhawk will continue to voluntarily work with the IDNR towards implementation of the identified improvements or others as necessary to demonstrate compliance with NAAQS. It is understood that the proposed improvements and implementation schedule may vary as feasibility and cost implications are more fully evaluated, but that ultimately, an administrative consent order will be negotiated to formalize the schedule and conditions for final implementation of the selected modifications.

Table 1
Model Input Parameters
Blackhawk Foundry Machine Co., Inc.
PM2.5 Air Dispersion Model
Phase 0 - Base Model

Source Desc	Source ID	Emission Point	Easting (meters)	Northing (meters)	Base Elev (meters)	24-Hour Modeled Emissions* (gm/sec)	Height (meters)	Temp (deg. K)	Exit Vel. (m/sec)	Diameter (meters)
Cupola Stack	EP201	EP 201	698618	4598589	178	2.02E+00	25.91	338.71	15.79	1.02
Mill Room	EP203	EP 203	698568	4598592	178	1.23E-01	15.24	310.93	18.33	0.91
Sand System Scrubber	EP204	EP 204	698633	4598559	178	1.90E-01	22.86	311.89	14.58	1.42
Core Oven	EP209	EP 209	698629	4598540	178	1.82E-03	7.32	338.71	2.83	0.36
Cold Box Scrubber	EP214	EP 214	698630	4598518	178	0.00E+00	8.53	294.26	0.00	0.37
Core Oven 2	EP225	EP 225	698616	4598526	178	1.76E-03	9.75	347.04	5.87	0.35
Railcar Coke Unloading	COKEHND	-	698598	4598605	178	2.34E-04	1.22	295	0.001	1.00
Limestone Pile Handling	LIMEHND	-	698618	4598615	178	8.33E-05	1.22	295	0.001	1.00
Scrap Handling	SCRPHAND	-	698593	4598593	178	2.50E-03	1.83	295	0.001	1.00
Waste Sand Handling	WSANDHND	-	698594	4598622	178	1.83E-04	1.22	295	0.001	1.00
Lost Foam Collector	EP213	EP213	698670	4598621	178	1.24E-02	13.1	310.93	10.42	0.92
Sand Bin Vent	EP228	EP228	698672	4598641	178	7.37E-05	11.3	310.93	0.001	1.00
Drying Oven	EP230	EP230	698672	4598634	178	6.80E-04	12.5	322.00	0.001	0.31
Pouring Afterburner	EP231	EP231	698655	4598626	178	4.60E-03	12.5	338.71	0.001	0.41

Source Desc	Source ID	Emission Point	X (meters)	Y (meters)	Base Elev (meters)	Modeled Emissions* (gm/sec)	Height (meters)	Init. Sy (meters)	Init. Sz (meters)
Coreroom	CORERM	EP 208	698608	4598538	178	6.55E-04	3.35	6.51	3.12
Cold Box Core Room	CBROOM	EP 215	698628	4598522	178	1.22E-03	3.35	4.96	3.12
Warmbox Core Room	WARM	EP 210	698558	4598548	178	1.16E-04	3.66	6.28	3.40
Foundry High Bay 1	FH1	EP 207	698583	4598560	178	2.70E-02	8.53	3.72	0.85
Foundry High Bay 2	FH2	EP 207	698590	4598563	178	2.70E-02	8.53	3.72	0.85
Foundry High Bay 3	FH3	EP 207	698596	4598566	178	2.70E-02	8.53	3.72	0.85
Foundry High Bay 4	FH4	EP 207	698603	4598569	178	2.70E-02	8.53	3.72	0.85
Foundry High Bay 5	FH5	EP 207	698609	4598571	178	2.70E-02	8.53	3.72	0.85
Lost Foam Bld 1	LFB1	EP 213	698641	4598635	178	6.38E-05	5.79	11.63	5.39
Lost Foam Bld 2	LFB2	EP 213	698658	4598633	178	6.38E-05	5.79	11.63	5.39

Source Desc	Source ID	Emission Point	X (meters)	Y (meters)	Base Elev (meters)	Modeled Emissions* (gm/sec)	Height (meters)	Width (meters)	Length (meters)	Angle (degrees)
Coke pile	COKEPILE	-	698598	4598610	178	1.22E-07	1.83	15.0	30.0	0
Waste Sand Storage Pile	WASTESND	-	698589	4598615	178	8.52E-07	1.83	7.5	15.0	0
Limestone Pile	LIMEPILE	-	698615	4598610	178	1.22E-07	1.83	7.5	15.0	0

Source Desc	Source ID	Emission Point	X (meters)	Y (meters)	Base Elev (meters)	Modeled Emissions* (gm/sec)	Height (meters)	Radius (meters)	No. of Verts	Init. Sz (meters)
Scrap pile	SCRAP	-	698580	4598601	178	6.09E-07	2.44	11.58	20	0

Table 1
Model Input Parameters
Blackhawk Foundry Machine Co., Inc.
PM2.5 Air Dispersion Model
Phase 1 - Fence Revisions, Elcetric Oven, Afterburner Raincap

Source Desc	Source ID	Emission Point	Easting (meters)	Northing (meters)	Base Elev (meters)	24-Hour Modeled Emissions* (gm/sec)	Height (meters)	Temp (deg. K)	Exit Vel. (m/sec)	Diameter (meters)
Cupola Stack	EP201	EP 201	698618	4598589	178	2.02E+00	25.91	338.71	15.79	1.02
Mill Room	EP203	EP 203	698568	4598592	178	1.23E-01	15.24	310.93	18.33	0.91
Sand System Scrubber	EP204	EP 204	698633	4598559	178	1.90E-01	22.86	311.89	14.58	1.42
Core Oven	EP209	EP 209	698629	4598540	178	1.82E-03	7.32	338.71	2.83	0.36
Cold Box Scrubber	EP214	EP 214	698630	4598518	178	0.00E+00	8.53	294.26	0.00	0.37
Core Oven 2	EP225	EP 225	698616	4598526	178	1.76E-03	9.75	347.04	5.87	0.35
Railcar Coke Unloading	COKEHND	-	698598	4598605	178	2.34E-04	1.22	295	0.001	1.00
Limestone Pile Handling	LIMEHND	-	698618	4598615	178	8.33E-05	1.22	295	0.001	1.00
Scrap Handling	SCRPHAND	-	698593	4598593	178	2.50E-03	1.83	295	0.001	1.00
Waste Sand Handling	WSANDHND	-	698594	4598622	178	1.83E-04	1.22	295	0.001	1.00
Lost Foam Collector	EP213	EP213	698670	4598621	178	1.24E-02	13.1	310.93	10.42	0.92
Sand Bin Vent	EP228	EP228	698672	4598641	178	7.37E-05	11.3	310.93	0.001	1.00
Drying Oven	EP230	EP230	698672	4598634	178	**0.00E+00**	12.5	322.00	**3.23**	0.31
Pouring Afterburner	EP231	EP231	698655	4598626	178	4.60E-03	12.5	338.71	**10.91**	0.41

Source Desc	Source ID	Emission Point	X (meters)	Y (meters)	Base Elev (meters)	Modeled Emissions* (gm/sec)	Height (meters)	Init. Sy (meters)	Init. Sz (meters)
Coreroom	CORERM	EP 208	698608	4598538	178	6.55E-04	3.35	6.51	3.12
Cold Box Core Room	CBROOM	EP 215	698628	4598522	178	1.22E-03	3.35	4.96	3.12
Warmbox Core Room	WARM	EP 210	698558	4598548	178	1.16E-04	3.66	6.28	3.40
Foundry High Bay 1	FH1	EP 207	698583	4598560	178	2.70E-02	8.53	3.72	0.85
Foundry High Bay 2	FH2	EP 207	698590	4598563	178	2.70E-02	8.53	3.72	0.85
Foundry High Bay 3	FH3	EP 207	698596	4598566	178	2.70E-02	8.53	3.72	0.85
Foundry High Bay 4	FH4	EP 207	698603	4598569	178	2.70E-02	8.53	3.72	0.85
Foundry High Bay 5	FH5	EP 207	698609	4598571	178	2.70E-02	8.53	3.72	0.85
Lost Foam Bld 1	LFB1	EP 213	698641	4598635	178	6.38E-05	5.79	11.63	5.39
Lost Foam Bld 2	LFB2	EP 213	698658	4598633	178	6.38E-05	5.79	11.63	5.39

Source Desc	Source ID	Emission Point	X (meters)	Y (meters)	Base Elev (meters)	Modeled Emissions* (gm/sec)	Height (meters)	Width (meters)	Length (meters)	Angle (degrees)
Coke pile	COKEPILE	-	698598	4598610	178	1.22E-07	1.83	15.0	30.0	0
Waste Sand Storage Pile	WASTESND	-	698589	4598615	178	8.52E-07	1.83	7.5	15.0	0
Limestone Pile	LIMEPILE	-	698615	4598610	178	1.22E-07	1.83	7.5	15.0	0

Source Desc	Source ID	Emission Point	X (meters)	Y (meters)	Base Elev (meters)	Modeled Emissions* (gm/sec)	Height (meters)	Radius (meters)	No. of Verts	Init. Sz (meters)
Scrap pile	SCRAP	-	698580	4598601	178	6.09E-07	2.44	11.58	20	0

Table 1
Model Input Parameters
Blackhawk Foundry Machine Co., Inc.
PM2.5 Air Dispersion Model
Phase 2 - Cupola, Mill Room, and Sand System Stacks

Source Desc	Source ID	Emission Point	Easting (meters)	Northing (meters)	Base Elev (meters)	24-Hour Modeled Emissions* (gm/sec)	Height (meters)	Temp (deg. K)	Exit Vel. (m/sec)	Diameter (meters)
Cupola Stack	EP201	EP 201	698618	4598589	178	2.02E+00	**48.77**	338.71	15.79	1.02
Mill Room	EP203	EP 203	698568	4598592	178	1.23E-01	**30.48**	310.93	18.33	0.91
Sand System Scrubber	EP204	EP 204	698633	4598559	178	1.90E-01	**30.48**	311.89	14.58	1.42
Core Oven	EP209	EP 209	698629	4598540	178	1.82E-03	7.32	338.71	2.83	0.36
Cold Box Scrubber	EP214	EP 214	698630	4598518	178	0.00E+00	8.53	294.26	0.00	0.37
Core Oven 2	EP225	EP 225	698616	4598526	178	1.76E-03	9.75	347.04	5.87	0.35
Railcar Coke Unloading	COKEHND	-	698598	4598605	178	2.34E-04	1.22	295	0.001	1.00
Limestone Pile Handling	LIMEHND	-	698618	4598615	178	8.33E-05	1.22	295	0.001	1.00
Scrap Handling	SCRPHAND	-	698593	4598593	178	2.50E-03	1.83	295	0.001	1.00
Waste Sand Handling	WSANDHND	-	698594	4598622	178	1.83E-04	1.22	295	0.001	1.00
Lost Foam Collector	EP213	EP213	698670	4598621	178	1.24E-02	13.1	310.93	10.42	0.92
Sand Bin Vent	EP228	EP228	698672	4598641	178	7.37E-05	11.3	310.93	0.001	1.00
Drying Oven	EP230	EP230	698672	4598634	178	**0.00E+00**	12.5	322.00	**3.23**	0.31
Pouring Afterburner	EP231	EP231	698655	4598626	178	4.60E-03	12.5	338.71	**10.91**	0.41

Source Desc	Source ID	Emission Point	X (meters)	Y (meters)	Base Elev (meters)	Modeled Emissions* (gm/sec)	Height (meters)	Init. Sy (meters)	Init. Sz (meters)
Coreroom	CORERM	EP 208	698608	4598538	178	6.55E-04	3.35	6.51	3.12
Cold Box Core Room	CBROOM	EP 215	698628	4598522	178	1.22E-03	3.35	4.96	3.12
Warmbox Core Room	WARM	EP 210	698558	4598548	178	1.16E-04	3.66	6.28	3.40
Foundry High Bay 1	FH1	EP 207	698583	4598560	178	2.70E-02	8.53	3.72	0.85
Foundry High Bay 2	FH2	EP 207	698590	4598563	178	2.70E-02	8.53	3.72	0.85
Foundry High Bay 3	FH3	EP 207	698596	4598566	178	2.70E-02	8.53	3.72	0.85
Foundry High Bay 4	FH4	EP 207	698603	4598569	178	2.70E-02	8.53	3.72	0.85
Foundry High Bay 5	FH5	EP 207	698609	4598571	178	2.70E-02	8.53	3.72	0.85
Lost Foam Bld 1	LFB1	EP 213	698641	4598635	178	6.38E-05	5.79	11.63	5.39
Lost Foam Bld 2	LFB2	EP 213	698658	4598633	178	6.38E-05	5.79	11.63	5.39

Source Desc	Source ID	Emission Point	X (meters)	Y (meters)	Base Elev (meters)	Modeled Emissions* (gm/sec)	Height (meters)	Width (meters)	Length (meters)	Angle (degrees)
Coke pile	COKEPILE	-	698598	4598610	178	1.22E-07	1.83	15.0	30.0	0
Waste Sand Storage Pile	WASTESND	-	698589	4598615	178	8.52E-07	1.83	7.5	15.0	0
Limestone Pile	LIMEPILE	-	698615	4598610	178	1.22E-07	1.83	7.5	15.0	0

Source Desc	Source ID	Emission Point	X (meters)	Y (meters)	Base Elev (meters)	Modeled Emissions* (gm/sec)	Height (meters)	Radius (meters)	No. of Verts	Init. Sz (meters)
Scrap pile	SCRAP	-	698580	4598601	178	6.09E-07	2.44	11.58	20	0

Table 1
Model Input Parameters
Blackhawk Foundry Machine Co., Inc.
PM2.5 Air Dispersion Model
Phase 3 - Foundry Control Equipment

Source Desc	Source ID	Emission Point	Easting (meters)	Northing (meters)	Base Elev (meters)	24-Hour Modeled Emissions* (gm/sec)	Height (meters)	Temp (deg. K)	Exit Vel. (m/sec)	Diameter (meters)
Cupola Stack	EP201	EP 201	698618	4598589	178	2.02E+00	**48.77**	338.71	15.79	1.02
Mill Room	EP203	EP 203	698568	4598592	178	1.23E-01	**30.48**	310.93	18.33	0.91
Sand System Scrubber	EP204	EP 204	698633	4598559	178	1.90E-01	**30.48**	311.89	14.58	1.42
Core Oven	EP209	EP 209	698629	4598540	178	1.82E-03	7.32	338.71	2.83	0.36
Cold Box Scrubber	EP214	EP 214	698630	4598518	178	0.00E+00	8.53	294.26	0.00	0.37
Core Oven 2	EP225	EP 225	698616	4598526	178	1.76E-03	9.75	347.04	5.87	0.35
Foundry High Bay 1	FH1	EP 207	698583	4598560	178	**0.00E+00**	**14.63**	**311.89**	**0**	**1.68**
Foundry High Bay 2	FH2	EP 207	698590	4598563	178	**0.00E+00**	**14.63**	**311.89**	**0**	**1.68**
Foundry High Bay 3	FH3	EP 207	698596	4598566	178	**1.15E-01**	**14.63**	**311.89**	**21.38**	**1.68**
Foundry High Bay 4	FH4	EP 207	698603	4598569	178	**0.00E+00**	**14.63**	**311.89**	**0**	**1.68**
Foundry High Bay 5	FH5	EP 207	698609	4598571	178	**0.00E+00**	**14.63**	**311.89**	**0**	**1.68**
Railcar Coke Unloading	COKEHND	-	698598	4598605	178	2.34E-04	1.22	295	0.001	1.00
Limestone Pile Handling	LIMEHND	-	698618	4598615	178	8.33E-05	1.22	295	0.001	1.00
Scrap Handling	SCRPHAND	-	698593	4598593	178	2.50E-03	1.83	295	0.001	1.00
Waste Sand Handling	WSANDHND	-	698594	4598622	178	1.83E-04	1.22	295	0.001	1.00
Lost Foam Collector	EP213	EP213	698670	4598621	178	1.24E-02	13.1	310.93	10.42	0.92
Sand Bin Vent	EP228	EP228	698672	4598641	178	7.37E-05	11.3	310.93	0.001	1.00
Drying Oven	EP230	EP230	698672	4598634	178	**0.00E+00**	12.5	322.00	**3.23**	0.31
Pouring Afterburner	EP231	EP231	698655	4598626	178	4.60E-03	12.5	338.71	**10.91**	0.41

Source Desc	Source ID	Emission Point	X (meters)	Y (meters)	Base Elev (meters)	Modeled Emissions* (gm/sec)	Height (meters)	Init. Sy (meters)	Init. Sz (meters)
Coreroom	CORERM	EP 208	698608	4598538	178	6.55E-04	3.35	6.51	3.12
Cold Box Core Room	CBROOM	EP 215	698628	4598522	178	1.22E-03	3.35	4.96	3.12
Warmbox Core Room	WARM	EP 210	698558	4598548	178	1.16E-04	3.66	6.28	3.40
Lost Foam Bld 1	LFB1	EP 213	698641	4598635	178	6.38E-05	5.79	11.63	5.39
Lost Foam Bld 2	LFB2	EP 213	698658	4598633	178	6.38E-05	5.79	11.63	5.39

Source Desc	Source ID	Emission Point	X (meters)	Y (meters)	Base Elev (meters)	Modeled Emissions* (gm/sec)	Height (meters)	Width (meters)	Length (meters)	Angle (degrees)
Coke pile	COKEPILE	-	698598	4598610	178	1.22E-07	1.83	15.0	30.0	0
Waste Sand Storage Pile	WASTESND	-	698589	4598615	178	8.52E-07	1.83	7.5	15.0	0
Limestone Pile	LIMEPILE	-	698615	4598610	178	1.22E-07	1.83	7.5	15.0	0

Source Desc	Source ID	Emission Point	X (meters)	Y (meters)	Base Elev (meters)	Modeled Emissions* (gm/sec)	Height (meters)	Radius (meters)	No. of Verts	Init. Sz (meters)
Scrap pile	SCRAP	-	698580	4598601	178	6.09E-07	2.44	11.58	20	0

Table 1
Model Input Parameters
Blackhawk Foundry Machine Co., Inc.
PM2.5 Air Dispersion Model
Phase 4 - Material Storage Shed

Source Desc	Source ID	Emission Point	Easting (meters)	Northing (meters)	Base Elev (meters)	24-Hour Modeled Emissions* (gm/sec)	Height (meters)	Temp (deg. K)	Exit Vel. (m/sec)	Diameter (meters)
Cupola Stack	EP201	EP 201	698618	4598589	178	2.02E+00	**48.77**	338.71	15.79	1.02
Mill Room	EP203	EP 203	698568	4598592	178	1.23E-01	**30.48**	310.93	18.33	0.91
Sand System Scrubber	EP204	EP 204	698633	4598559	178	1.90E-01	**30.48**	311.89	14.58	1.42
Core Oven	EP209	EP 209	698629	4598540	178	1.82E-03	7.32	338.71	2.83	0.36
Cold Box Scrubber	EP214	EP 214	698630	4598518	178	0.00E+00	8.53	294.26	0.00	0.37
Core Oven 2	EP225	EP 225	698616	4598526	178	1.76E-03	9.75	347.04	5.87	0.35
Foundry High Bay 1	FH1	EP 207	698583	4598560	178	**0.00E+00**	**14.63**	**311.89**	**0**	**1.68**
Foundry High Bay 2	FH2	EP 207	698590	4598563	178	**0.00E+00**	**14.63**	**311.89**	**0**	**1.68**
Foundry High Bay 3	FH3	EP 207	698596	4598566	178	**1.15E-01**	**14.63**	**311.89**	**21.38**	**1.68**
Foundry High Bay 4	FH4	EP 207	698603	4598569	178	**0.00E+00**	**14.63**	**311.89**	**0**	**1.68**
Foundry High Bay 5	FH5	EP 207	698609	4598571	178	**0.00E+00**	**14.63**	**311.89**	**0**	**1.68**
Railcar Coke Unloading	COKEHND	-	698598	4598605	178	2.34E-04	1.22	295	0.001	1.00
Limestone Pile Handling	LIMEHND	-	698618	4598615	178	8.33E-05	1.22	295	0.001	1.00
Scrap Handling	SCRPHAND	-	698593	4598593	178	2.50E-03	1.83	295	0.001	1.00
Waste Sand Handling	WSANDHND	-	698594	4598622	178	1.83E-04	1.22	295	0.001	1.00
Lost Foam Collector	EP213	EP213	698670	4598621	178	1.24E-02	13.1	310.93	10.42	0.92
Sand Bin Vent	EP228	EP228	698672	4598641	178	7.37E-05	11.3	310.93	0.001	1.00
Drying Oven	EP230	EP230	698672	4598634	178	**0.00E+00**	12.5	322.00	**3.23**	0.31
Pouring Afterburner	EP231	EP231	698655	4598626	178	4.60E-03	12.5	338.71	**10.91**	0.41

Source Desc	Source ID	Emission Point	X (meters)	Y (meters)	Base Elev (meters)	Modeled Emissions* (gm/sec)	Height (meters)	Init. Sy (meters)	Init. Sz (meters)
Coreroom	CORERM	EP 208	698608	4598538	178	6.55E-04	3.35	6.51	3.12
Cold Box Core Room	CBROOM	EP 215	698628	4598522	178	1.22E-03	3.35	4.96	3.12
Warmbox Core Room	WARM	EP 210	698558	4598548	178	1.16E-04	3.66	6.28	3.40
Lost Foam Bld 1	LFB1	EP 213	698641	4598635	178	6.38E-05	5.79	11.63	5.39
Lost Foam Bld 2	LFB2	EP 213	698658	4598633	178	6.38E-05	5.79	11.63	5.39

Source Desc	Source ID	Emission Point	X (meters)	Y (meters)	Base Elev (meters)	Modeled Emissions* (gm/sec)	Height (meters)	Width (meters)	Length (meters)	Angle (degrees)
Coke pile	COKEPILE	-	698598	4598610	178	**6.09E-08**	1.83	15.0	30.0	0
Waste Sand Storage Pile	WASTESND	-	698589	4598615	178	**4.26E-07**	1.83	7.5	15.0	0
Limestone Pile	LIMEPILE	-	698615	4598610	178	**6.09E-08**	1.83	7.5	15.0	0

Source Desc	Source ID	Emission Point	X (meters)	Y (meters)	Base Elev (meters)	Modeled Emissions* (gm/sec)	Height (meters)	Radius (meters)	No. of Verts	Init. Sz (meters)
Scrap pile	SCRAP	-	698580	4598601	178	**3.04E-07**	2.44	11.58	20	0

Table 2
40 Highest 8th-High 24-Hour Values
Blackhawk Foundry Machine Co., Inc.
PM2.5 Air Dispersion Model
Phase 0 - Base Model

Receptor		Model Results (μg/m^3)					5-Year Average
Northing	Easting	2003	2004	2005	2006	2007	
698505.9	4598556.0	26.01	25.35	23.86	24.71	23.63	24.71
698661.7	4598568.5	24.08	24.37	18.20	25.19	19.24	22.22
698652.7	4598510.0	20.67	17.36	23.13	25.78	23.95	22.18
698672.7	4598546.5	21.90	22.25	21.36	24.99	19.36	21.97
698516.4	4598533.5	24.89	20.71	21.33	22.54	19.84	21.86
698496.1	4598577.5	20.18	22.97	20.38	19.29	24.44	21.45
698497.4	4598578.5	20.50	22.95	19.97	19.23	24.27	21.38
698498.8	4598579.5	20.36	22.86	20.04	19.26	24.01	21.31
698675.2	4598520.5	22.20	17.26	18.05	23.75	21.00	20.45
698575.9	4598505.0	22.27	19.33	23.04	17.65	18.06	20.07
698689.3	4598554.5	19.79	20.59	18.88	22.43	17.71	19.88
698559.1	4598496.5	21.30	20.59	22.13	17.95	17.15	19.82
698607.1	4598659.5	19.95	21.60	19.03	18.51	19.06	19.63
698525.4	4598514.0	20.77	18.09	20.49	19.50	18.78	19.52
698450.0	4598550.0	20.30	19.34	18.37	20.63	18.78	19.48
698526.9	4598510.5	20.48	16.99	21.01	20.61	18.26	19.47
698683.9	4598524.5	22.08	17.12	17.60	21.27	19.05	19.42
698700.0	4598532.5	20.07	19.25	18.15	19.71	18.71	19.18
698632.1	4598657.5	18.07	21.06	19.86	16.69	18.38	18.81
698492.6	4598593.0	18.51	19.45	18.14	16.76	20.68	18.71
698500.0	4598500.0	19.67	18.20	18.62	19.42	17.60	18.70
698700.0	4598500.0	19.54	15.27	17.75	22.10	18.85	18.70
698630.2	4598499.0	15.84	15.11	21.41	20.72	19.09	18.43
698677.7	4598577.0	20.28	19.86	15.32	19.78	16.76	18.40
698657.0	4598656.0	17.25	20.76	18.04	16.64	19.23	18.38
698487.4	4598599.5	18.72	19.22	16.79	15.54	19.26	17.91
698537.5	4598488.0	17.66	17.63	20.26	17.25	16.60	17.88
698538.2	4598486.5	17.64	17.38	20.48	16.81	16.53	17.77
698586.8	4598482.5	18.74	17.47	19.29	16.75	16.28	17.71
698588.5	4598479.0	18.22	16.94	18.67	16.60	15.97	17.28
698582.2	4598661.0	18.09	19.68	15.10	15.05	18.06	17.20
698720.3	4598542.0	16.03	17.97	16.85	17.92	16.03	16.96
698607.6	4598488.0	14.57	15.74	18.12	18.30	17.95	16.94
698682.0	4598654.5	14.82	17.34	16.03	15.21	17.68	16.22
698350.0	4598650.0	16.20	15.97	15.76	14.36	17.72	16.00
698400.0	4598700.0	16.32	16.08	16.84	16.40	14.02	15.93
698460.0	4598632.5	17.66	16.49	16.05	13.12	15.47	15.76
698250.0	4598650.0	16.05	14.54	15.79	14.21	17.48	15.62
698471.4	4598618.5	16.27	14.98	16.29	14.13	16.29	15.59
698850.0	4598450.0	17.55	13.86	13.02	16.03	17.37	15.57

Table 2
40 Highest 8th-High 24-Hour Values
Blackhawk Foundry Machine Co., Inc.
PM2.5 Air Dispersion Model
Phase 1 - Fence Revisions, Elcetric Oven, Afterburner Raincap

Receptor		Model Results (μg/m^3)					5-Year
Northing	Easting	2003	2004	2005	2006	2007	Average
698505.9	4598556.0	25.95	25.26	23.66	24.60	23.50	24.59
698652.7	4598510.0	20.67	17.36	23.13	25.49	23.94	22.12
698516.4	4598533.5	24.81	20.54	21.30	22.40	19.80	21.77
698496.1	4598577.5	20.14	22.87	20.34	19.25	24.26	21.37
698497.4	4598578.5	20.47	22.82	19.77	19.19	24.17	21.28
698498.8	4598579.5	20.34	22.79	19.85	19.25	23.91	21.23
698675.2	4598520.5	22.08	17.23	18.04	23.75	21.00	20.42
698575.9	4598505.0	22.19	19.22	22.87	17.55	18.03	19.97
698559.1	4598496.5	21.08	20.37	22.02	17.88	17.11	19.69
698450.0	4598550.0	20.21	19.32	18.35	20.56	18.74	19.44
698525.4	4598514.0	20.53	18.05	20.26	19.42	18.66	19.38
698607.1	4598659.5	19.56	21.59	18.83	18.27	18.68	19.38
698526.9	4598510.5	20.40	16.95	20.90	20.51	18.08	19.37
698700.0	4598532.5	20.00	19.24	18.15	19.71	18.65	19.15
698697.8	4598531.5	20.25	18.94	18.17	19.51	18.86	19.15
698700.0	4598500.0	19.53	15.26	17.72	22.10	18.84	18.69
698492.6	4598593.0	18.46	19.43	18.10	16.69	20.63	18.66
698500.0	4598500.0	19.63	18.12	18.57	19.39	17.53	18.65
698630.2	4598499.0	15.58	14.98	21.34	20.71	18.86	18.29
698632.1	4598657.5	16.54	20.44	19.01	15.78	18.12	17.98
698487.4	4598599.5	18.67	19.21	16.76	15.32	19.16	17.82
698537.5	4598488.0	17.51	17.54	20.16	17.21	16.56	17.79
698538.2	4598486.5	17.56	17.30	20.41	16.77	16.49	17.71
698586.8	4598482.5	18.60	17.34	19.08	16.70	16.25	17.59
698588.5	4598479.0	18.13	16.82	18.46	16.55	15.95	17.18
698657.0	4598656.0	16.34	19.47	16.92	15.46	17.09	17.06
698582.2	4598661.0	17.83	19.68	14.82	14.72	17.92	17.00
698720.3	4598542.0	15.95	17.96	16.85	17.89	16.02	16.94
698607.6	4598488.0	14.30	15.70	18.06	18.20	17.89	16.83
698350.0	4598650.0	16.17	15.92	15.61	14.27	17.66	15.93
698400.0	4598700.0	16.30	16.08	16.79	16.37	14.02	15.91
698460.0	4598632.5	17.62	16.30	16.03	13.07	15.47	15.70
698250.0	4598650.0	16.03	14.49	15.77	14.18	17.41	15.58
698850.0	4598450.0	17.52	13.84	12.98	16.01	17.35	15.54
698471.4	4598618.5	16.24	14.98	16.16	14.08	16.07	15.51
698400.0	4598500.0	19.26	13.85	14.06	15.49	14.43	15.42
698465.2	4598637.5	17.50	15.44	15.47	12.94	15.37	15.34
698450.0	4598450.0	15.11	13.88	17.44	15.97	13.67	15.21
698800.0	4598500.0	16.14	15.97	13.39	15.09	15.34	15.19
698483.2	4598654.5	16.20	15.04	15.04	14.72	13.61	14.92

Table 2
40 Highest 8th-High 24-Hour Values
Blackhawk Foundry Machine Co., Inc.
PM2.5 Air Dispersion Model
Phase 2 - Cupola, Mill Room, and Sand System Stacks

Receptor		Model Results ($\mu g/m^3$)					5-Year Average
Northing	Easting	2003	2004	2005	2006	2007	
698505.9	4598556.0	19.59	19.58	19.62	20.96	21.72	20.29
698652.7	4598510.0	17.23	15.25	20.38	22.87	21.44	19.43
698607.1	4598659.5	19.25	21.37	18.54	18.22	18.62	19.20
698496.1	4598577.5	17.99	19.40	17.98	16.87	21.54	18.76
698498.8	4598579.5	18.00	19.20	18.27	17.00	21.20	18.73
698497.4	4598578.5	18.05	19.25	18.11	17.01	21.20	18.72
698516.4	4598533.5	21.32	17.93	18.00	19.06	17.16	18.70
698675.2	4598520.5	19.93	15.74	16.34	21.00	17.62	18.13
698632.1	4598657.5	16.48	20.41	18.82	15.53	17.98	17.84
698575.9	4598505.0	19.40	17.26	19.66	16.12	15.09	17.51
698525.4	4598514.0	17.58	15.87	17.71	17.66	16.08	16.98
698559.1	4598496.5	17.49	18.03	18.54	15.29	14.76	16.82
698582.2	4598661.0	17.64	19.23	14.71	14.24	17.81	16.73
698657.0	4598656.0	15.72	19.45	16.71	15.04	16.49	16.68
698492.6	4598593.0	16.85	17.22	16.43	14.88	18.01	16.68
698526.9	4598510.5	17.12	15.13	17.52	17.04	15.28	16.42
698697.8	4598531.5	16.87	16.30	15.27	16.77	15.18	16.08
698700.0	4598532.5	16.47	16.37	15.52	16.56	14.83	15.95
698700.0	4598500.0	16.27	13.63	14.35	20.06	15.37	15.93
698487.4	4598599.5	15.61	17.26	15.28	13.86	17.12	15.83
698586.8	4598482.5	17.08	15.35	17.27	14.99	14.36	15.81
698630.2	4598499.0	12.64	12.92	19.28	17.51	16.62	15.80
698588.5	4598479.0	16.62	15.29	16.31	14.95	14.47	15.53
698538.2	4598486.5	14.51	15.13	17.67	13.93	14.27	15.10
698537.5	4598488.0	14.63	15.15	17.36	13.67	14.28	15.02
698500.0	4598500.0	15.81	14.95	14.43	15.75	14.08	15.00
698607.6	4598488.0	12.52	13.96	16.16	16.49	15.74	14.97
698450.0	4598550.0	12.85	15.02	14.21	14.01	15.51	14.32
698720.3	4598542.0	13.24	14.92	13.56	15.08	14.16	14.19
698557.2	4598662.5	14.90	14.51	13.08	13.37	13.92	13.96
698557.1	4598662.5	14.89	14.48	13.08	13.38	13.94	13.95
698682.0	4598654.5	12.26	14.48	13.99	12.52	14.25	13.50
698600.0	4598700.0	13.33	15.20	12.22	12.23	13.08	13.21
698200.0	4598600.0	14.33	12.81	12.20	11.76	13.72	12.97
698250.0	4598650.0	13.91	10.22	12.99	11.74	14.74	12.72
698471.4	4598618.5	12.71	12.90	13.60	10.68	12.44	12.46
698532.3	4598660.5	12.70	13.00	10.53	12.42	12.19	12.17
698742.9	4598553.0	11.81	11.92	10.89	13.00	11.47	11.82
698706.9	4598653.0	11.23	11.89	11.33	11.04	13.26	11.75
698750.0	4598550.0	11.33	11.89	10.67	12.53	11.42	11.57

Table 2
40 Highest 8th-High 24-Hour Values
Blackhawk Foundry Machine Co., Inc.
PM2.5 Air Dispersion Model
Phase 3 - Foundry Control Equipment

Receptor		Model Results ($\mu g/m^3$)					5-Year Average
Northing	Easting	2003	2004	2005	2006	2007	
698652.7	4598510.0	5.94	4.99	6.45	6.89	7.07	6.27
698492.6	4598593.0	5.58	6.39	5.07	5.03	6.75	5.76
698498.8	4598579.5	5.22	6.12	5.71	4.82	6.64	5.70
698607.1	4598659.5	5.76	5.42	6.03	5.52	5.38	5.62
698487.4	4598599.5	5.78	5.70	5.06	4.73	6.71	5.60
698497.4	4598578.5	5.30	5.65	5.76	4.64	6.38	5.54
698471.4	4598618.5	6.04	4.78	5.56	4.64	6.16	5.44
698465.2	4598637.5	5.02	4.96	5.27	5.39	6.45	5.42
698496.1	4598577.5	5.29	5.49	5.68	4.28	6.08	5.36
698484.9	4598656.5	5.23	6.61	4.94	4.47	5.45	5.34
698632.1	4598657.5	5.19	5.19	5.41	5.27	5.19	5.25
698657.0	4598656.0	5.47	5.36	5.23	5.02	5.18	5.25
698507.4	4598658.5	5.23	5.58	5.16	5.23	4.82	5.20
698483.2	4598654.5	5.70	6.05	4.72	4.51	4.99	5.19
698460.0	4598632.5	5.07	4.63	5.53	4.60	5.93	5.15
698582.2	4598661.0	5.17	5.22	4.52	4.75	5.07	4.95
698532.3	4598660.5	5.24	5.38	4.37	4.86	4.49	4.87
698630.2	4598499.0	4.24	4.31	5.10	5.26	5.01	4.78
698505.9	4598556.0	3.89	4.62	5.39	4.41	5.03	4.67
698450.0	4598650.0	4.35	4.69	4.16	4.34	5.26	4.56
698675.2	4598520.5	4.53	3.89	4.28	4.61	4.73	4.41
698300.0	4598700.0	4.23	4.36	3.76	3.90	5.37	4.32
698700.0	4598900.0	4.42	4.43	4.53	3.71	4.00	4.22
698400.0	4598700.0	4.36	4.19	3.51	4.18	4.74	4.20
698650.0	4598850.0	4.65	4.63	4.10	3.76	3.78	4.18
698650.0	4598950.0	4.43	4.68	3.86	4.21	3.71	4.18
698750.0	4598950.0	4.34	4.15	4.20	3.72	4.23	4.13
698350.0	4598650.0	4.13	3.92	4.04	3.73	4.67	4.10
698600.0	4598700.0	4.17	4.48	3.86	3.83	3.86	4.04
698350.0	4598750.0	4.06	4.34	3.64	4.08	3.95	4.02
698557.1	4598662.5	4.05	4.07	3.78	3.84	4.33	4.01
698557.2	4598662.5	4.05	4.06	3.78	3.85	4.33	4.01
698700.0	4598500.0	4.01	3.34	3.86	4.19	4.49	3.98
698700.0	4599000.0	4.09	4.47	3.91	3.82	3.59	3.97
698600.0	4598900.0	4.36	4.19	3.58	3.43	4.19	3.95
698750.0	4598850.0	3.98	4.17	3.89	3.45	4.02	3.90
698250.0	4598650.0	3.91	3.75	3.81	3.53	4.46	3.89
698800.0	4598900.0	4.14	4.23	3.62	3.41	4.06	3.89
698250.0	4598750.0	4.29	3.78	3.46	3.93	3.98	3.89
698300.0	4598600.0	3.78	4.17	3.48	3.44	4.55	3.88

Table 2
40 Highest 8th-High 24-Hour Values
Blackhawk Foundry Machine Co., Inc.
PM2.5 Air Dispersion Model
Phase 4 - Material Storage Shed

Receptor		Model Results (μg/m^3)					5-Year
Northing	Easting	2003	2004	2005	2006	2007	Average
698652.7	4598510.0	5.92	4.98	6.41	6.80	7.01	6.22
698492.6	4598593.0	5.44	6.29	4.87	4.89	6.50	5.60
698498.8	4598579.5	5.09	6.01	5.65	4.73	6.38	5.57
698487.4	4598599.5	5.60	5.57	4.97	4.66	6.38	5.44
698497.4	4598578.5	5.17	5.50	5.63	4.54	6.28	5.43
698607.1	4598659.5	5.64	5.29	5.72	5.29	5.17	5.42
698465.2	4598637.5	4.80	4.85	5.14	5.22	6.27	5.26
698471.4	4598618.5	5.87	4.58	5.32	4.46	5.98	5.24
698496.1	4598577.5	5.21	5.27	5.54	4.19	5.99	5.24
698657.0	4598656.0	5.41	5.36	5.22	4.99	5.02	5.20
698484.9	4598656.5	5.08	6.38	4.83	4.31	5.25	5.17
698632.1	4598657.5	5.04	4.94	5.32	5.21	5.19	5.14
698507.4	4598658.5	5.04	5.43	4.97	5.06	4.68	5.04
698483.2	4598654.5	5.43	5.88	4.51	4.37	4.86	5.01
698460.0	4598632.5	4.89	4.53	5.24	4.49	5.67	4.96
698582.2	4598661.0	5.04	5.06	4.28	4.41	4.91	4.74
698630.2	4598499.0	4.23	4.23	5.00	5.17	4.93	4.71
698532.3	4598660.5	5.01	5.21	4.26	4.65	4.34	4.70
698505.9	4598556.0	3.78	4.56	5.32	4.21	5.01	4.58
698450.0	4598650.0	4.26	4.49	3.97	4.18	5.16	4.41
698675.2	4598520.5	4.44	3.84	4.24	4.54	4.70	4.35
698300.0	4598700.0	4.19	4.34	3.76	3.88	5.28	4.29
698700.0	4598900.0	4.39	4.42	4.53	3.70	3.95	4.20
698650.0	4598950.0	4.43	4.67	3.85	4.20	3.71	4.17
698650.0	4598850.0	4.60	4.62	4.07	3.75	3.77	4.16
698750.0	4598950.0	4.31	4.12	4.18	3.71	4.23	4.11
698400.0	4598700.0	4.24	4.00	3.48	4.05	4.57	4.07
698350.0	4598650.0	3.93	3.91	4.00	3.71	4.53	4.02
698350.0	4598750.0	4.01	4.29	3.63	4.05	3.91	3.98
698700.0	4599000.0	4.09	4.45	3.89	3.81	3.59	3.97
698600.0	4598700.0	4.12	4.37	3.80	3.77	3.63	3.93
698700.0	4598500.0	3.96	3.32	3.82	4.17	4.38	3.93
698600.0	4598900.0	4.36	4.18	3.53	3.43	4.14	3.93
698750.0	4598850.0	3.97	4.16	3.88	3.43	3.98	3.88
698800.0	4598900.0	4.11	4.23	3.62	3.40	4.05	3.88
698250.0	4598650.0	3.89	3.73	3.81	3.51	4.46	3.88
698700.0	4598800.0	3.84	3.98	4.16	3.36	4.03	3.87
698557.1	4598662.5	3.94	3.89	3.69	3.64	4.14	3.86
698557.2	4598662.5	3.94	3.89	3.68	3.64	4.14	3.86
698300.0	4598600.0	3.75	4.17	3.46	3.36	4.54	3.86

Table 3
40 Highest Annual Average Values
Blackhawk Foundry Machine Co., Inc.
PM2.5 Air Dispersion Model
Phase 0 - Base Model

Receptor		Model Results (µg/m³)					5-Year
Northing	Easting	2003	2004	2005	2006	2007	Average
698661.7	4598568.5	5.94	5.62	5.43	5.70	5.68	5.67
698672.7	4598546.5	5.61	5.21	5.21	5.60	5.49	5.42
698632.1	4598657.5	4.98	5.78	5.17	4.78	5.54	5.25
698657.0	4598656.0	4.84	5.81	5.00	4.57	5.47	5.14
698652.7	4598510.0	4.69	3.99	5.39	5.87	5.32	5.05
698607.1	4598659.5	4.83	5.46	4.87	4.54	5.10	4.96
698675.2	4598520.5	4.98	4.18	4.93	5.35	5.18	4.92
698683.9	4598524.5	4.90	4.21	4.71	5.08	5.04	4.79
698677.7	4598577.0	4.87	4.71	4.52	4.66	4.73	4.70
698689.3	4598554.5	4.67	4.51	4.39	4.66	4.63	4.57
698505.9	4598556.0	4.78	4.35	4.54	4.27	4.52	4.49
698700.0	4598532.5	4.43	4.05	4.19	4.45	4.55	4.33
698498.8	4598579.5	4.39	4.38	4.17	3.90	4.41	4.25
698497.4	4598578.5	4.35	4.34	4.14	3.88	4.39	4.22
698496.1	4598577.5	4.34	4.32	4.14	3.88	4.39	4.21
698700.0	4598500.0	4.00	3.26	4.07	4.43	4.32	4.02
698582.2	4598661.0	3.98	4.44	3.82	3.77	4.03	4.01
698516.4	4598533.5	4.62	3.61	4.14	3.85	3.67	3.98
698630.2	4598499.0	3.30	3.17	4.63	4.70	3.95	3.95
698682.0	4598654.5	3.79	4.41	3.74	3.49	4.24	3.93
698720.3	4598542.0	3.80	3.69	3.62	3.82	3.93	3.77
698492.6	4598593.0	3.82	3.92	3.69	3.48	3.85	3.75
698575.9	4598505.0	3.86	3.71	3.76	3.38	2.90	3.52
698487.4	4598599.5	3.55	3.62	3.49	3.28	3.59	3.51
698525.4	4598514.0	3.87	3.08	3.62	3.49	2.95	3.40
698526.9	4598510.5	3.72	3.01	3.56	3.44	2.87	3.32
698742.9	4598553.0	3.28	3.29	3.13	3.31	3.38	3.28
698557.2	4598662.5	3.28	3.44	3.02	3.24	3.26	3.25
698557.1	4598662.5	3.27	3.44	3.02	3.24	3.26	3.25
698450.0	4598550.0	3.42	3.15	3.28	3.06	3.28	3.24
698750.0	4598550.0	3.23	3.23	3.09	3.25	3.34	3.23
698559.1	4598496.5	3.57	3.36	3.40	3.07	2.59	3.20
698600.0	4598700.0	3.06	3.59	3.11	2.92	3.23	3.18
698800.0	4598500.0	3.18	2.90	3.05	3.18	3.44	3.15
698607.6	4598488.0	2.86	2.91	3.61	3.43	2.91	3.14
698754.1	4598558.0	3.12	3.13	2.95	3.12	3.17	3.10
698748.7	4598569.5	3.14	3.12	2.93	3.08	3.13	3.08
698850.0	4598450.0	3.11	2.60	2.99	3.14	3.43	3.05
698706.9	4598653.0	3.01	3.30	2.84	2.74	3.26	3.03
698471.4	4598618.5	3.09	3.02	3.08	2.87	3.08	3.03

Table 3
40 Highest Annual Average Values
Blackhawk Foundry Machine Co., Inc.
PM2.5 Air Dispersion Model
Phase 1 - Fence Revisions, Elcetric Oven, Afterburner Raincap

Receptor		Model Results ($\mu g/m^3$)					5-Year
Northing	Easting	2003	2004	2005	2006	2007	Average
698652.7	4598510.0	4.65	3.95	5.35	5.82	5.29	5.01
698675.2	4598520.5	4.95	4.15	4.87	5.30	5.14	4.88
698632.1	4598657.5	4.33	5.09	4.55	4.15	4.91	4.61
698607.1	4598659.5	4.38	5.01	4.44	4.12	4.69	4.53
698505.9	4598556.0	4.76	4.33	4.52	4.25	4.51	4.47
698657.0	4598656.0	4.09	4.98	4.27	3.83	4.70	4.37
698697.8	4598531.5	4.46	4.04	4.20	4.47	4.56	4.34
698700.0	4598532.5	4.39	4.01	4.13	4.40	4.49	4.28
698498.8	4598579.5	4.36	4.36	4.14	3.88	4.38	4.22
698497.4	4598578.5	4.33	4.32	4.11	3.86	4.36	4.20
698496.1	4598577.5	4.32	4.30	4.12	3.86	4.36	4.19
698700.0	4598500.0	3.98	3.24	4.04	4.40	4.29	3.99
698516.4	4598533.5	4.60	3.59	4.12	3.83	3.65	3.96
698630.2	4598499.0	3.27	3.14	4.60	4.67	3.93	3.92
698582.2	4598661.0	3.83	4.29	3.66	3.62	3.88	3.85
698492.6	4598593.0	3.80	3.89	3.65	3.46	3.81	3.72
698720.3	4598542.0	3.75	3.65	3.56	3.75	3.87	3.72
698575.9	4598505.0	3.84	3.69	3.73	3.36	2.88	3.50
698487.4	4598599.5	3.53	3.60	3.46	3.26	3.56	3.48
698525.4	4598514.0	3.86	3.06	3.60	3.48	2.93	3.39
698682.0	4598654.5	3.17	3.80	3.22	2.88	3.66	3.35
698526.9	4598510.5	3.71	2.99	3.54	3.42	2.85	3.30
698450.0	4598550.0	3.41	3.14	3.26	3.05	3.27	3.22
698742.9	4598553.0	3.24	3.25	3.08	3.24	3.32	3.22
698559.1	4598496.5	3.56	3.34	3.37	3.06	2.58	3.18
698750.0	4598550.0	3.18	3.20	3.04	3.19	3.29	3.18
698557.2	4598662.5	3.17	3.33	2.91	3.14	3.14	3.14
698557.1	4598662.5	3.17	3.33	2.91	3.14	3.14	3.14
698800.0	4598500.0	3.17	2.89	3.03	3.15	3.42	3.13
698607.6	4598488.0	2.83	2.89	3.59	3.41	2.89	3.12
698600.0	4598700.0	2.99	3.52	3.05	2.85	3.17	3.12
698754.1	4598558.0	3.07	3.09	2.91	3.06	3.12	3.05
698850.0	4598450.0	3.10	2.59	2.98	3.12	3.42	3.04
698748.7	4598569.5	3.09	3.08	2.87	3.01	3.06	3.02
698471.4	4598618.5	3.06	2.99	3.05	2.84	3.05	3.00
698586.8	4598482.5	3.13	3.12	3.16	2.95	2.52	2.98
698500.0	4598500.0	3.39	2.62	3.18	3.01	2.57	2.95
698750.0	4598450.0	2.81	2.23	3.04	3.36	3.20	2.93
698588.5	4598479.0	3.03	3.03	3.10	2.90	2.48	2.91
698738.3	4598591.5	3.03	2.93	2.71	2.78	2.88	2.87

Table 3
40 Highest Annual Average Values
Blackhawk Foundry Machine Co., Inc.
PM2.5 Air Dispersion Model
Phase 2 - Cupola, Mill Room, and Sand System Stacks

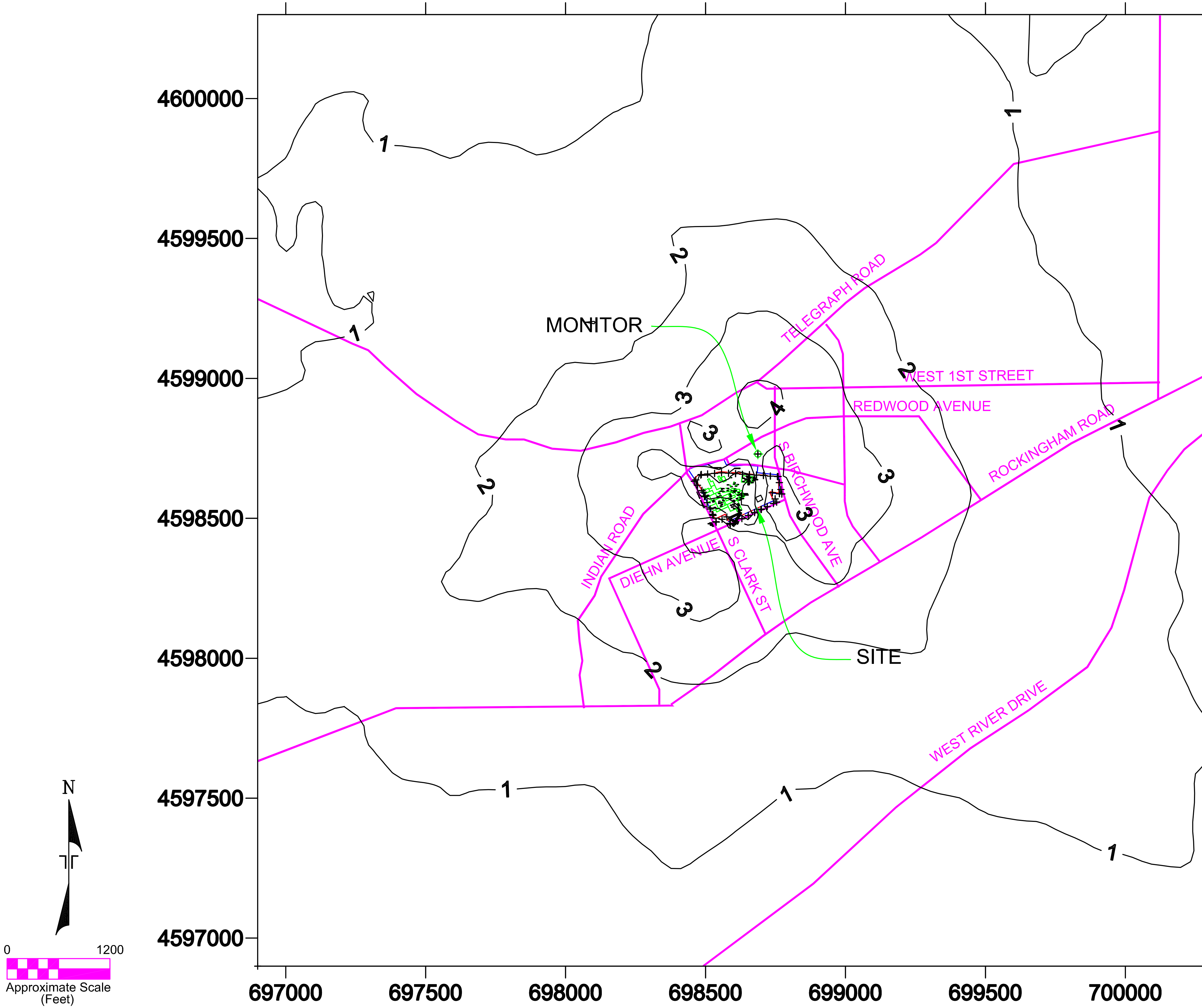
Receptor		Model Results ($\mu g/m^3$)					5-Year
Northing	Easting	2003	2004	2005	2006	2007	Average
698632.1	4598657.5	4.26	5.00	4.47	4.07	4.82	4.53
698652.7	4598510.0	4.13	3.52	4.75	5.18	4.70	4.46
698607.1	4598659.5	4.30	4.93	4.37	4.05	4.61	4.45
698675.2	4598520.5	4.43	3.73	4.38	4.76	4.58	4.38
698657.0	4598656.0	3.98	4.85	4.15	3.72	4.56	4.25
698697.8	4598531.5	3.87	3.52	3.66	3.91	3.94	3.78
698582.2	4598661.0	3.70	4.16	3.55	3.52	3.75	3.73
698700.0	4598532.5	3.79	3.48	3.58	3.82	3.86	3.71
698505.9	4598556.0	3.77	3.59	3.64	3.35	3.77	3.62
698498.8	4598579.5	3.64	3.78	3.52	3.26	3.80	3.60
698497.4	4598578.5	3.61	3.75	3.50	3.23	3.77	3.57
698496.1	4598577.5	3.58	3.71	3.48	3.21	3.76	3.55
698700.0	4598500.0	3.41	2.78	3.46	3.77	3.64	3.41
698630.2	4598499.0	2.84	2.73	3.97	4.03	3.41	3.40
698516.4	4598533.5	3.87	3.00	3.42	3.12	3.12	3.31
698492.6	4598593.0	3.34	3.48	3.26	3.05	3.38	3.30
698682.0	4598654.5	3.00	3.59	3.03	2.71	3.42	3.15
698575.9	4598505.0	3.45	3.27	3.33	2.95	2.57	3.11
698487.4	4598599.5	3.11	3.22	3.11	2.90	3.15	3.10
698720.3	4598542.0	3.11	3.02	2.96	3.13	3.20	3.08
698557.2	4598662.5	3.00	3.17	2.76	2.99	2.95	2.98
698557.1	4598662.5	3.00	3.17	2.75	2.99	2.95	2.97
698525.4	4598514.0	3.28	2.55	3.08	2.93	2.53	2.87
698600.0	4598700.0	2.67	3.17	2.74	2.56	2.84	2.80
698526.9	4598510.5	3.13	2.48	3.03	2.88	2.46	2.80
698607.6	4598488.0	2.52	2.58	3.14	2.98	2.55	2.75
698559.1	4598496.5	3.02	2.79	2.89	2.54	2.20	2.69
698586.8	4598482.5	2.80	2.79	2.79	2.59	2.24	2.64
698532.3	4598660.5	2.64	2.60	2.41	2.71	2.53	2.58
698742.9	4598553.0	2.58	2.58	2.46	2.61	2.66	2.58
698588.5	4598479.0	2.69	2.69	2.72	2.53	2.19	2.56
698706.9	4598653.0	2.49	2.76	2.37	2.23	2.68	2.51
698471.4	4598618.5	2.54	2.50	2.60	2.37	2.50	2.50
698750.0	4598550.0	2.48	2.48	2.38	2.51	2.58	2.49
698748.7	4598569.5	2.48	2.45	2.31	2.43	2.47	2.43
698450.0	4598550.0	2.47	2.41	2.47	2.24	2.51	2.42
698738.3	4598591.5	2.55	2.45	2.28	2.33	2.42	2.41
698739.2	4598591.5	2.53	2.44	2.26	2.32	2.41	2.39
698754.1	4598558.0	2.40	2.40	2.28	2.41	2.46	2.39
698500.0	4598500.0	2.72	2.10	2.56	2.38	2.09	2.37

Table 3
40 Highest Annual Average Values
Blackhawk Foundry Machine Co., Inc.
PM2.5 Air Dispersion Model
Phase 3 - Foundry Control Equipment

Receptor		Model Results (μg/m^3)					5-Year
Northing	Easting	2003	2004	2005	2006	2007	Average
698632.1	4598657.5	1.82	1.97	1.81	1.78	1.89	1.85
698657.0	4598656.0	1.77	1.95	1.73	1.72	1.86	1.81
698607.1	4598659.5	1.72	1.90	1.76	1.67	1.78	1.77
698652.7	4598510.0	1.50	1.27	1.55	1.68	1.66	1.53
698582.2	4598661.0	1.25	1.41	1.28	1.29	1.31	1.31
698675.2	4598520.5	1.29	1.08	1.23	1.36	1.34	1.26
698492.6	4598593.0	1.16	1.17	1.16	1.05	1.14	1.14
698487.4	4598599.5	1.14	1.12	1.16	1.05	1.15	1.12
698498.8	4598579.5	1.13	1.11	1.19	0.99	1.15	1.12
698497.4	4598578.5	1.11	1.09	1.18	0.98	1.15	1.10
698496.1	4598577.5	1.10	1.07	1.17	0.97	1.14	1.09
698682.0	4598654.5	1.08	1.16	0.99	1.03	1.13	1.08
698630.2	4598499.0	0.99	0.97	1.18	1.20	1.05	1.08
698532.3	4598660.5	1.10	1.07	1.03	1.08	1.02	1.06
698557.2	4598662.5	1.03	1.07	0.99	1.08	1.03	1.04
698557.1	4598662.5	1.03	1.07	0.99	1.08	1.03	1.04
698471.4	4598618.5	1.07	0.95	1.10	0.95	1.10	1.03
698507.4	4598658.5	1.05	1.03	1.03	0.98	0.94	1.01
698483.2	4598654.5	1.01	1.05	0.97	0.93	0.95	0.98
698600.0	4598700.0	0.93	1.08	0.98	0.93	0.98	0.98
698505.9	4598556.0	1.00	0.93	1.07	0.91	0.98	0.98
698697.8	4598531.5	1.01	0.84	0.95	1.06	1.03	0.98
698484.9	4598656.5	1.00	1.05	0.96	0.93	0.94	0.98
698465.2	4598637.5	0.94	0.96	1.00	0.96	1.02	0.97
698460.0	4598632.5	0.95	0.91	1.01	0.93	1.01	0.96
698700.0	4598532.5	0.98	0.83	0.92	1.03	1.01	0.95
698700.0	4598500.0	0.93	0.76	0.95	1.03	1.05	0.94
698575.9	4598505.0	0.98	0.91	0.98	0.86	0.83	0.91
698516.4	4598533.5	0.94	0.83	0.93	0.83	0.84	0.87
698650.0	4598750.0	0.79	0.93	0.85	0.75	0.88	0.84
698450.0	4598650.0	0.82	0.85	0.84	0.81	0.85	0.84
698720.3	4598542.0	0.85	0.74	0.80	0.89	0.86	0.83
698706.9	4598653.0	0.81	0.84	0.70	0.76	0.82	0.79
698650.0	4598850.0	0.74	0.87	0.82	0.70	0.80	0.79
698700.0	4598900.0	0.74	0.86	0.82	0.68	0.82	0.78
698748.7	4598569.5	0.81	0.74	0.75	0.82	0.80	0.78
698742.9	4598553.0	0.81	0.72	0.75	0.83	0.80	0.78
698738.3	4598591.5	0.81	0.75	0.73	0.79	0.80	0.78
698739.2	4598591.5	0.80	0.74	0.73	0.79	0.80	0.77
698754.1	4598558.0	0.79	0.71	0.73	0.81	0.78	0.77

Table 3
40 Highest Annual Average Values
Blackhawk Foundry Machine Co., Inc.
PM2.5 Air Dispersion Model
Phase 4 - Material Storage Shed

Receptor		Model Results (μg/m^3)					5-Year
Northing	Easting	2003	2004	2005	2006	2007	Average
698632.1	4598657.5	1.76	1.91	1.76	1.73	1.83	1.80
698657.0	4598656.0	1.72	1.90	1.69	1.67	1.82	1.76
698607.1	4598659.5	1.66	1.83	1.71	1.62	1.72	1.71
698652.7	4598510.0	1.49	1.26	1.53	1.66	1.65	1.52
698582.2	4598661.0	1.20	1.35	1.22	1.24	1.25	1.25
698675.2	4598520.5	1.28	1.07	1.21	1.34	1.32	1.24
698492.6	4598593.0	1.14	1.14	1.12	1.02	1.11	1.11
698498.8	4598579.5	1.11	1.09	1.16	0.97	1.13	1.09
698487.4	4598599.5	1.11	1.09	1.12	1.03	1.11	1.09
698497.4	4598578.5	1.09	1.07	1.15	0.96	1.12	1.08
698496.1	4598577.5	1.08	1.04	1.14	0.95	1.12	1.07
698630.2	4598499.0	0.99	0.96	1.17	1.18	1.04	1.07
698682.0	4598654.5	1.03	1.12	0.96	0.98	1.09	1.04
698532.3	4598660.5	1.06	1.03	0.99	1.04	0.98	1.02
698471.4	4598618.5	1.04	0.92	1.06	0.92	1.06	1.00
698557.2	4598662.5	0.99	1.03	0.95	1.04	0.99	1.00
698557.1	4598662.5	0.99	1.03	0.95	1.04	0.99	1.00
698507.4	4598658.5	1.01	0.99	0.99	0.94	0.91	0.97
698697.8	4598531.5	0.99	0.83	0.93	1.04	1.01	0.96
698505.9	4598556.0	0.98	0.91	1.05	0.89	0.97	0.96
698600.0	4598700.0	0.91	1.04	0.95	0.91	0.95	0.95
698483.2	4598654.5	0.97	1.02	0.94	0.90	0.92	0.95
698484.9	4598656.5	0.97	1.02	0.93	0.89	0.91	0.94
698465.2	4598637.5	0.90	0.94	0.96	0.93	0.98	0.94
698700.0	4598532.5	0.97	0.82	0.91	1.02	0.99	0.94
698700.0	4598500.0	0.92	0.75	0.94	1.01	1.04	0.93
698460.0	4598632.5	0.92	0.88	0.97	0.90	0.98	0.93
698575.9	4598505.0	0.96	0.90	0.97	0.85	0.82	0.90
698516.4	4598533.5	0.92	0.81	0.92	0.81	0.83	0.86
698650.0	4598750.0	0.78	0.91	0.84	0.74	0.86	0.83
698720.3	4598542.0	0.84	0.73	0.79	0.87	0.84	0.81
698450.0	4598650.0	0.80	0.83	0.82	0.79	0.82	0.81
698650.0	4598850.0	0.74	0.86	0.81	0.70	0.80	0.78
698700.0	4598900.0	0.73	0.86	0.82	0.68	0.81	0.78
698748.7	4598569.5	0.80	0.73	0.73	0.80	0.79	0.77
698742.9	4598553.0	0.80	0.71	0.74	0.81	0.78	0.77
698738.3	4598591.5	0.79	0.73	0.71	0.77	0.78	0.76
698706.9	4598653.0	0.78	0.81	0.67	0.73	0.79	0.76
698739.2	4598591.5	0.79	0.73	0.71	0.77	0.78	0.76
698754.1	4598558.0	0.78	0.70	0.72	0.79	0.77	0.75



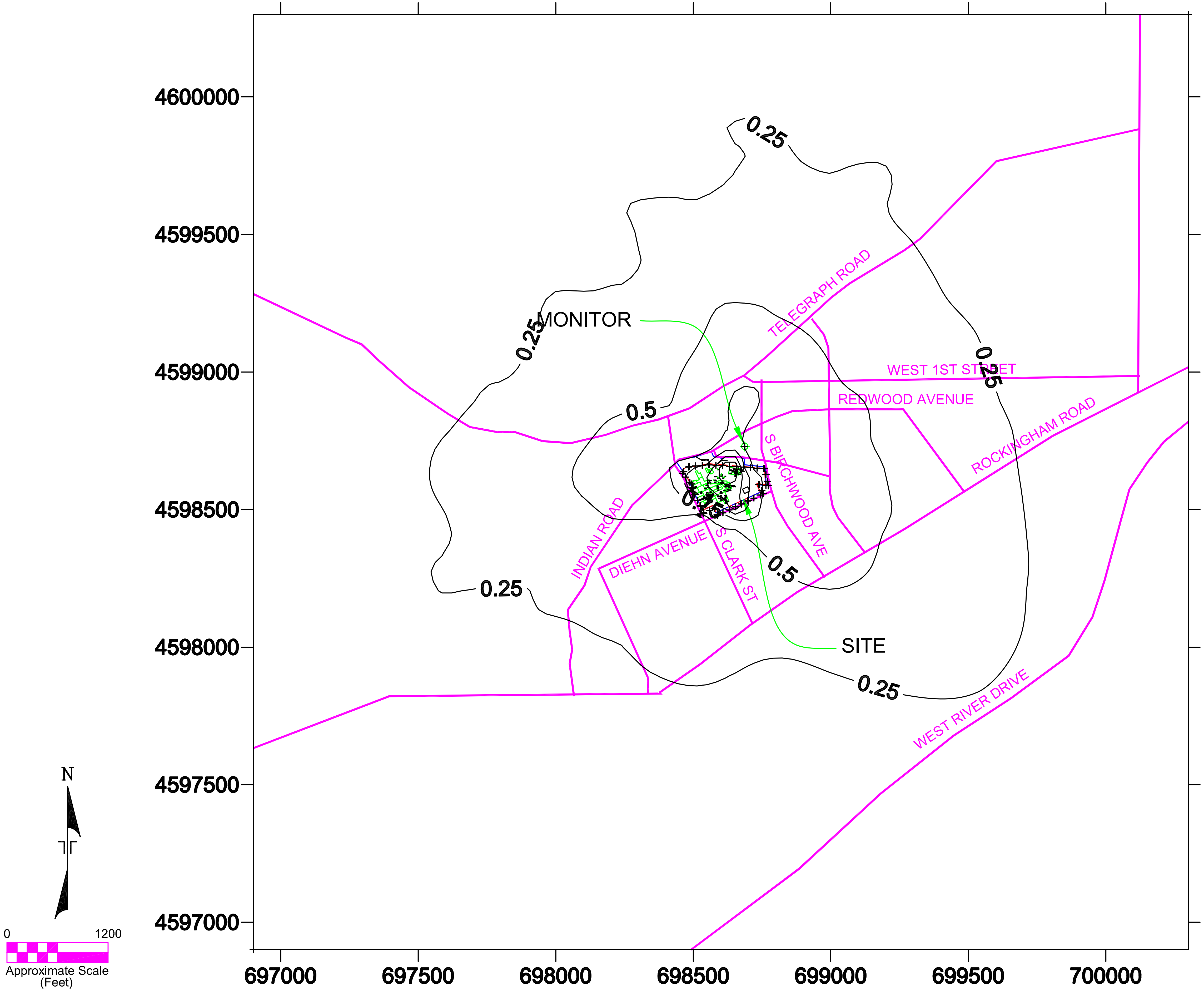
LEGEND

- PROPERTY LINE
- BUILDING
- FENCE
- EPxxx
- EUxxx
- CExxx

THIS DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

SITE DIAGRAM
PM2.5 DISPERSION MODEL
MITIGATION PLAN - 8th HIGH 24-HOUR VALUES
BLACKHAWK FOUNDRY AND MACHINE COMPANY
DAVENPORT, IOWA

Project Mngr:	JFB	Terracon	Project No.	07087001
Designed By:	JFB		Scale:	AS SHOWN
Drawn By:	JFB	870 40th Avenue	File No.	PM25 Model Fig 1
Checked By:	JFB	Bettendorf, Iowa 52722	Date:	SEP 2008
Approved By:	JFB	Figure No.		1



LEGEND

- PROPERTY LINE
- BUILDING
- FENCE
- EPxxx
- EUxxx
- CExxx

THIS DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

SITE DIAGRAM
PM2.5 DISPERSION MODEL
MITIGATION PLAN - ANNUAL AVERAGE VALUES
BLACKHAWK FOUNDRY AND MACHINE COMPANY
DAVENPORT, IOWA

Project Mngr:	JFB	Terracon	Project No.	07087001
Designed By:	JFB		Scale:	AS SHOWN
Drawn By:	JFB	870 40th Avenue	File No.	PM25 Model Fig 1
Checked By:	JFB	Bettendorf, Iowa 52722	Date:	JUL 2008
Approved By:	JFB	Figure No.		2

United Air Specialists, Inc.

a CLARCOR company

SFC SERIES

DOWNWARD FLOW CARTRIDGE DUST COLLECTOR

Clean air. It's what we do.®

SFC SERIES

HIGH PERFORMANCE, ENERGY EFFICIENT DUST COLLECTOR

The SFC is a proven, high-quality downward flow cartridge dust collection system. With its patented pulse cleaning technology, greater air capacity and quick and easy maintenance, there's no better air filtration method for your manufacturing facility.

Our SFC unit removes harmful pollutants resulting from common manufacturing processes — such as grinding, welding, buffing and sanding. The result: a safer, cleaner environment for your employees. By using our SFC unit, you're virtually eliminating air quality concerns in the workplace. Plus, you're ensuring increased employee productivity, fewer absences and illnesses, more efficient cleaning, and significant operational savings.

SFC 2-2

A WIDE RANGE OF APPLICATIONS

The high-performance SFC unit is ideal for all your dust and fume collection needs. Filtering out the polluted air that commonly occurs within a manufacturing environment, SFC's many industrial applications include grinding, welding, buffing, sanding, smelting, bulk powder handling, and more. Plus, our design allows for field expandability — so you can add modules and increase the capacity of your system at any time.

PATENTED PULSE CLEANING TECHNOLOGY

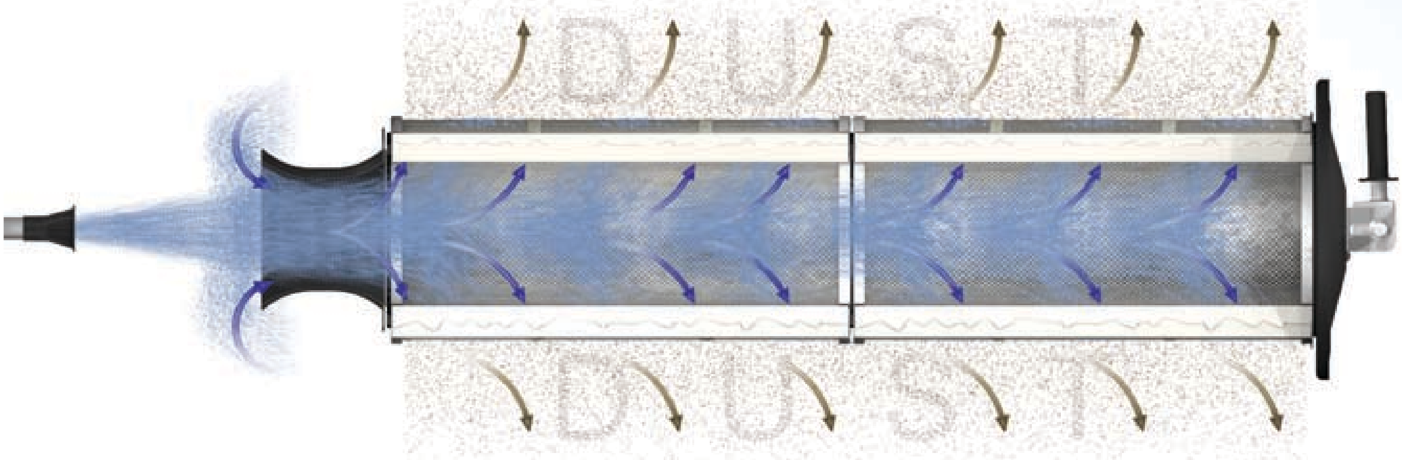
At the heart of the SFC system is the industry's most advanced pulse cleaning system technology. In designing the SFC unit, UAS engineers used Computational Fluid Dynamics computer modeling to develop the most effective system that "pulses off" dust from the filter — greatly improving the cartridge cleaning power. Utilizing an optimized nozzle and venturi, air is pulsed at a precisely calculated distance through an unobstructed airway. The result: Increased pulse cleaning energy, lower pressure drop and longer cartridge life. Plus, our patented pulse system cleans the full length of the cartridge. These unique, proprietary features assure years of dependable, efficient and cost effective performance.

EXTENDED CARTRIDGE LIFE WITH MORE POWER & LESS ENERGY

Unlike competitors, the SFC system uses external filter tracks to support the filters instead of "yokes" that interfere with cleaning. This allows for unobstructed airflow and increased cleaning power with less energy. By designing the SFC with optimized cabinets that broaden the space between cartridges and sidewalls, we ensured lower velocities and reduced cartridge abrasion. The result: dramatically increased cartridge life.

SFC PULSE BLAST

(U.S. Patent No. 6,902,592)



PULSE BLAST BENEFITS

FEWER PULSES are needed to clean the cartridge filters, so less compressed air is used. This is a substantial cost savings for the customer over the life of the unit.

FILTER LIFE IS INCREASED because fewer pulse cycles mean less stress on the filter media. This equates to less frequent filter changes and significant reduction in operating costs.

UNOBSTRUCTED AIRFLOW means there is more cleaning energy delivered to the filters to clean the entire length of the cartridge filter.

OPTIMIZED CLEANING provides maximum filter efficiency with the lowest possible outlet emissions.

At any point along the cartridge filter, the SFC unit provides 25% or more pulse cleaning power than the competition.

ADVANCED NANOFIBER CARTRIDGE FILTERS

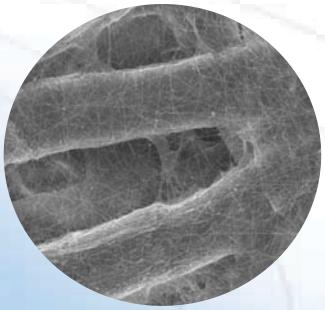
All SFC Series dust collectors come with the industry's best performing, most efficient standard cartridge filter. Independently certified at MERV 15*, UAS' Advanced Nanofiber cartridge filters last 50% longer than commodity filters, and are nearly 50% more efficient on sub-micron dust particles than MERV 13 filters.

Advanced Nanofiber Filtration technology is proven to achieve higher efficiency, cleaner air, lower pressure drop, longer filter life and greater energy savings than any other standard cartridge filter media. And, when used with the SFC Series dust collector, the advantages quickly add up to unsurpassed bottom-line savings—the most efficient and best value dust collector available for industrial air cleaning processes today.

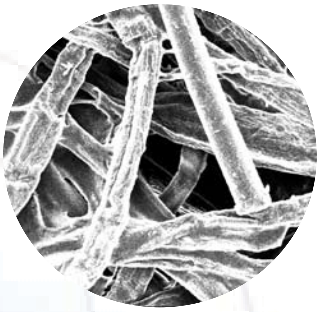
SURFACE LOADING IS KEY

UAS' Advanced nanofiber filters feature a special surface treatment of synthetic fibers so extremely fine, they are measured in fractions of a micron (nanometers). This ultra-thin layer traps dust and fume particulate on the surface of the filter before it can embed deeper in the media—leading to better cleaning efficiency with fewer pulses and significantly less compressed air use.

Our Advanced Nanofiber filters (MERV 15) are more than 85% efficient in capturing sub-micron particles from a contaminated air stream. In contrast, conventional cartridge filters, or 80/20 cellulose filters (MERV 8-10), are not capable of capturing such small particles and often require the additional use of a costly HEPA filter to ensure a safe breathing environment. This adds to overall filter cost and system upkeep.



Advanced Nanofiber at 600x



80/20 Cellulose at 600x

INVEST IN THE BEST

A cartridge dust collector is an important investment that impacts the performance of plant equipment and the health of your employees. To yield the best return and provide the safest work environment possible, it's important to choose a dust collector that utilizes an optimized pulse cleaning system to reap the full benefits of a nanofiber filter.

The result is:

LESS ENERGY USE

The SFC's patented pulse cleaning system actually uses less compressed air—a costly but necessary utility expense. This is achieved through the combination of increased power behind each pulse blast and the superior surface-loading ability of nanofiber filters. Each cleaning cycle is much more effective in removing dust from cartridge filters than other downflow collectors.

LONGER FILTER LIFE

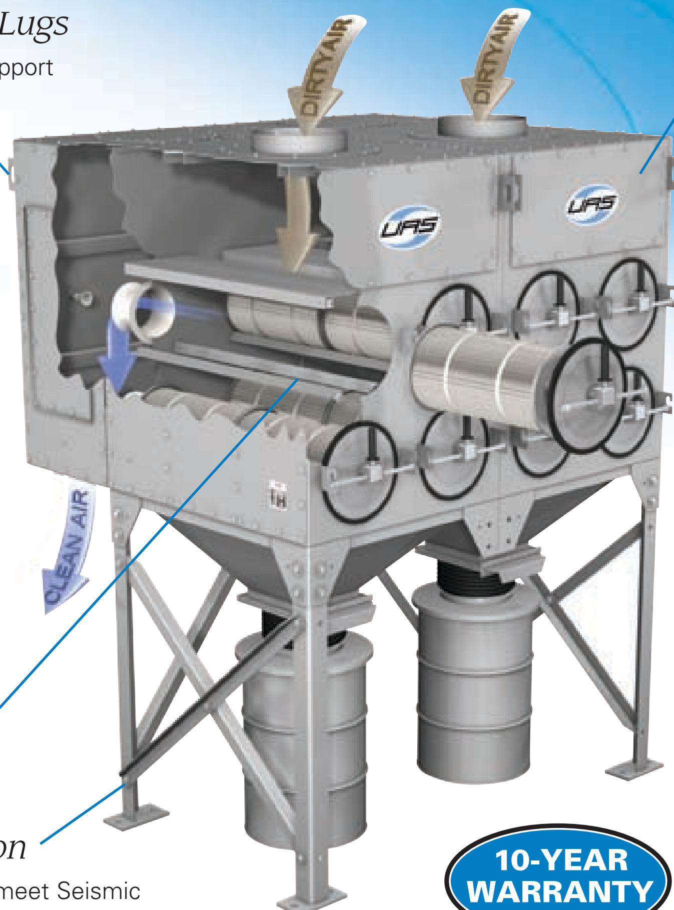
With less pulsing needed to clean surface-loading nanofiber cartridges, stress on the filters is minimized, resulting in double the filter life of a commodity filter.

A SMALLER DUST COLLECTION SYSTEM FOOTPRINT

The combination of the SFC's patented pulse cleaning system and nanofiber cartridge filters also allow for higher air-to-media ratios, potentially reducing the size of the dust collector and number of cartridges needed for your facility—a significant cost savings overall.

* Minimum Efficiency Reporting Value (MERV) is based on ASHRAE Standard 52.2-1999, and has been deemed the most accurate scale for determining a filter's efficiency and ability to filter submicron dust particles. UAS' MERV 15 efficiency has been tested per this standard by independent lab testing.

FEATURES AND BENEFITS



Heavy-duty Lifting Lugs

Ensure safe and secure support during installation.

Modular Design

Provides flexibility to increase unit capacity by adding modules at your facility.

Optimized Cartridge Cleaning System

Springless pulse valves and patented nozzle/venturi offer maximized cleaning power.

Horizontal Filters

Quick and easy access when replacing filters.

Heavy-duty Construction

Designed and manufactured to meet Seismic Zone 4 and 100 mph wind load structural rating.

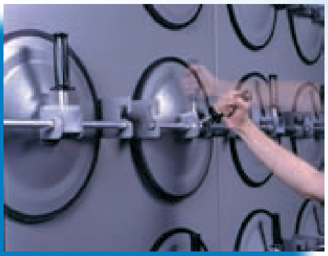
10-YEAR WARRANTY

Powder Coated Finish

All components have electrostatically applied paint that prevents fading and chalking.

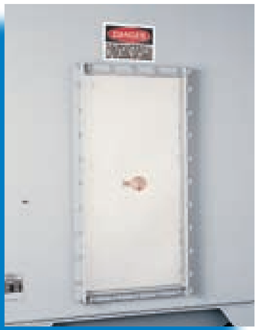
Quick & Easy Maintenance

With one simple movement of the handle, the SFC's "Quickseal" release door provides extremely fast filter removal and maintenance.



OPTIONS AND ACCESSORIES

Bag-In / Bag-Out Option provides clean, safe, easy removal of fine, hazardous or difficult-to-handle dusts.



Explosion Relief Vents minimize damage in the unlikely event of an explosion that may result when collecting explosive dusts.

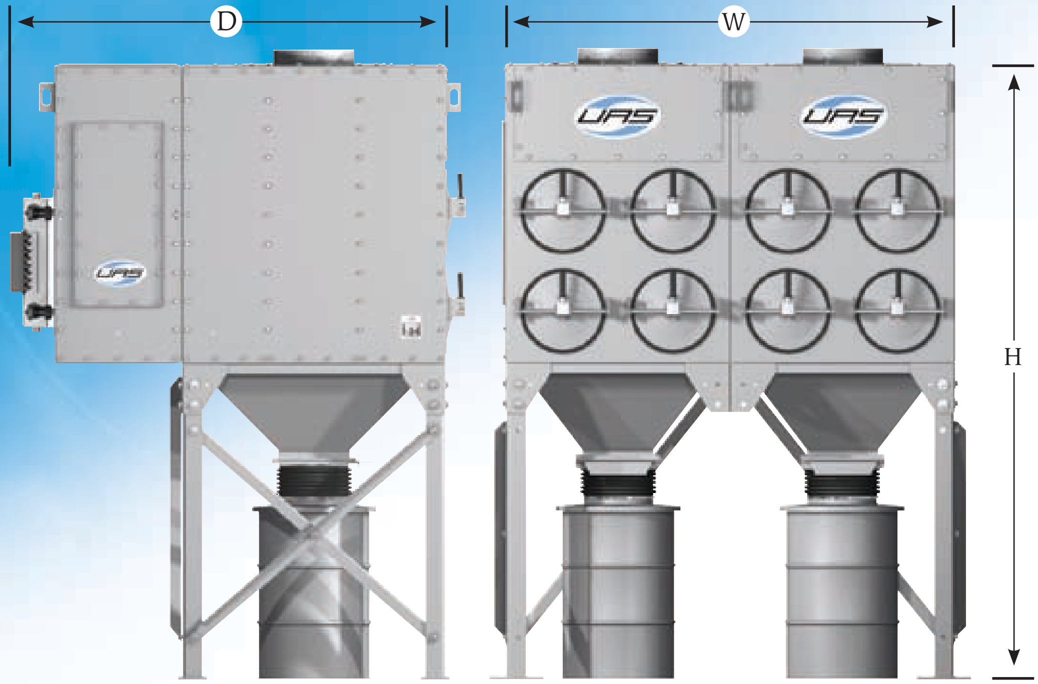
Digital Pressure Control / Digital Pressure Monitor allows users to program dust collector for continuous or on-demand pulse cleaning.

Blower Silencer Package reduces unit noise level to 80 dBA or less under normal operating conditions.

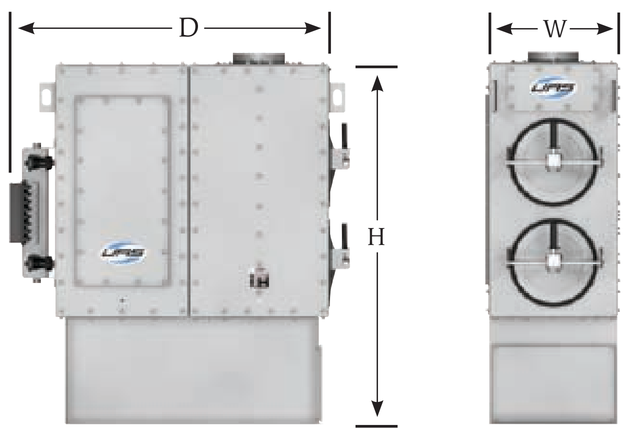
OTHER ADD-ONS

- Abrasive Inlet
- Safety After-Filters
- Fans
- Drum Lid Latch Kit
- Bin Vents
- Short Drums
- Drawer Base
- Service Platforms
- Control Panels
- Pneumatic Valve Assemblies
- Sprinkler Heads

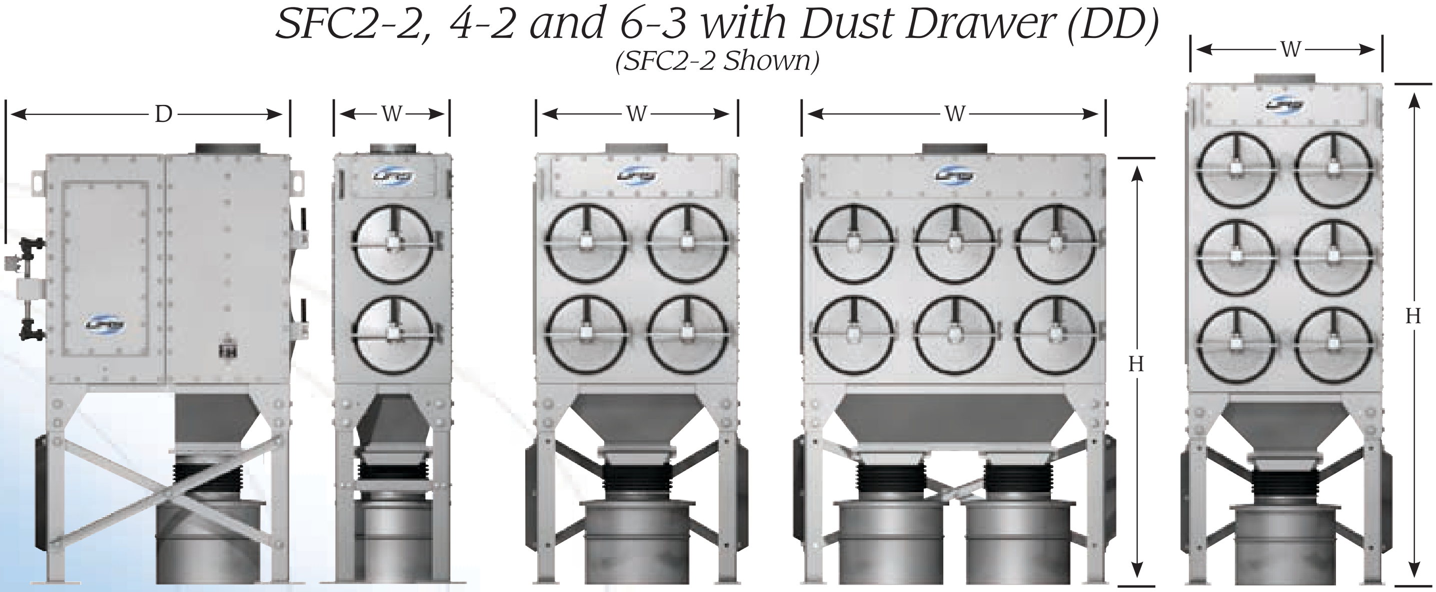
Other options and accessories available. Contact UAS for assistance.



SFC8-2 and Larger with Drum (H55)



SFC2-2, 4-2 and 6-3 with Dust Drawer (DD)
(SFC2-2 Shown)



SFC2-2 SFC4-2 SFC6-2 SFC6-3

with Short Drum (SD)

DIMENSIONS AND SPECIFICATIONS

SFC Models	Filter Quantity	Total Filter Media Area (FT²)	Valve Quantity	Module Quantity	Unit Weight (LBS)	Compressed Air Consumption SCF/ PULSE	Compressed Air Consumption SCFM 6P/Min	Height	Width	Depth
SFC 2 - 2 - SD	2	510	2	1	954	1.7	10.2	7' 8"	2' 1"	5' 1"
SFC 4 - 2 - SD	4	1020	4	1	1317	1.7	10.2	7' 8"	3' 7"	5' 1"
SFC 6 - 2 - SD	6	1530	6	1	1726	1.7	10.2	7' 8"	5' 4"	5' 1"
SFC 2 - 2 - DD	2	510	2	1	890	1.7	10.2	5' 4"	2' 1"	5' 1"
SFC 4 - 2 - DD	4	1020	4	1	1197	1.7	10.2	5' 4"	3' 7"	5' 1"
SFC 6 - 3 - DD	6	1530	6	1	2020	1.7	10.2	6' 11"	3' 7"	5' 1"
SFC 6 - 3 - SD	6	1530	6	1	1726	1.7	10.2	9' 4"	3' 7"	5' 1"
SFC 8 - 2 - H55	8	2040	4	1	1922	1.7	10.2	10' 3"	3' 9"	7' 3"
SFC 16 - 2 - H55	16	4080	8	2	3237	3.4	20.4	10' 3"	7' 6"	7' 3"
SFC 24 - 2 - H55	24	6120	12	3	4552	5.1	30.6	10' 3"	11' 3'	7' 3"
SFC 32 - 2 - H55	32	8160	16	4	5947	6.8	40.8	10' 3"	15' 0"	7' 3"
SFC 12 - 3 - H55	12	3060	6	1	2420	1.7	10.2	11' 11"	3' 9"	7' 3"
SFC 24 - 3 - H55	24	6120	12	2	4016	3.4	20.4	11' 11"	7' 6"	7' 3"
SFC 36 - 3 - H55	36	9180	18	3	5612	5.1	30.6	11' 11"	11' 3"	7' 3"
SFC 48 - 3 - H55	48	12240	24	4	7288	6.8	40.8	11' 11"	15' 0"	7' 3"
SFC 60 - 3 - H55	60	15300	30	5	8884	8.5	51	11' 11"	18' 9"	7' 3"
SFC 72 - 3 - H55	72	18360	36	6	10480	10.2	61.2	11' 11"	22' 6"	7' 3"
SFC 16 - 4 - H55	16	4080	8	1	2873	1.7	10.2	13' 7"	3' 9"	7' 3"
SFC 32 - 4 - H55	32	8160	16	2	4762	3.4	20.4	13' 7"	7' 6"	7' 3"
SFC 48 - 4 - H55	48	12240	24	3	6651	5.1	30.6	13' 7"	11' 3"	7' 3"
SFC 64 - 4 - H55	64	16320	32	4	8620	6.8	40.8	13' 7"	15' 0"	7' 3"
SFC 80 - 4 - H55	80	20400	40	5	10509	8.5	51	13' 7"	18' 9"	7' 3"
SFC 96 - 4 - H55	96	24480	48	6	12398	10.2	61.2	13' 7"	22' 6"	7' 3"
SFC 112 - 4 - H55	112	28560	56	7	14367	11.9	71.4	13' 7"	26' 3"	7' 3"
SFC 128 - 4 - H55	128	32640	64	8	16256	13.6	81.6	13' 7"	30' 0"	7' 3"
SFC 20 - 5 - H55	20	5100	10	1	3400	1.7	10.2	17' 6"	3' 9"	7' 3"
SFC 40 - 5 - H55	40	10200	20	2	5700	3.4	20.4	17' 6"	7' 6"	7' 3"
SFC 60 - 5 - H55	60	15300	30	3	7900	5.1	30.6	17' 6"	11' 3"	7' 3"
SFC 80 - 5 - H55	80	20400	40	4	10250	6.8	40.8	17' 6"	15' 0"	7' 3"
SFC 100 - 5 - H55	100	25500	50	5	12600	8.5	51	17' 6"	18' 9"	7' 3"
SFC 120 - 5 - H55	120	30600	60	6	14950	10.2	61.2	17' 6"	22' 6"	7' 3"

Short Drum (SD) units available in SFC 8 and larger. Subtract 16” from height.

WHY CHOOSE UNITED AIR SPECIALISTS?

A world-renowned reputation. For more than 40 years, we've been the industry leader in air quality technology — a proven track record that speaks for itself.

Commitment to quality products. Measuring our quality against documented expectations, we practice continuous improvement methods to anticipate challenges and implement successful solutions.

Unparalleled customer support. As a customer-driven solutions provider, we earn credibility and establish successful relationships by exceeding expectations for professional service and attitude.

Innovative technical leadership. Always, we keep technology at the forefront — ensuring continuous product advancements through ongoing investments in design and manufacturing.

UAS HEADQUARTERS – USA
4440 Creek Road
Cincinnati, Ohio 45242
Ph: 513-891-0400
1-800-252-4647
E-mail: info@uasinc.com
www.uasinc.com

UAS – GERMANY
Otto-Hahn-Strasse 6
D-65520 Bad Camberg
Ph: +49-6434-94220
E-mail: info@uas-inc.de
www.uas-inc.de

UAS – UNITED KINGDOM
PO Box 17
Folly Lane
Warrington, Cheshire
England WA5 0NP
Ph: +44-1925-654321
E-mail: uas@clarcoruk.com
www.uasuk.com

UAS – ASIA
Flat 1, 15/F, Block 1
Grand Pacific Views, Palatial Coast
Siu Lam, Tuen Mun
New Territories, Hong Kong
Ph: +852-2814-7722
E-mail: dlee@clarcor.com

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Clean air. It's what we do.®

Appendix N. Grain Processing Corporation Cover Letter for Proposed $PM_{2.5}$ Mitigation Plan

Where Innovation Comes Naturally
GPC®
ENVIRONMENTAL SERVICES

Grain Processing Corporation
1600 Oregon St.
Muscatine, IA 52761

October 15, 2008

Jim McGraw
Iowa Department of Natural Resources
Air Quality Bureau
7900 Hickman Rd
Urbandale, IA 50322

Subject: Proposed Facility Modification for Reduction of PM2.5 Ambient Impacts

Dear Jim:

On August 25, 2008, we met with Iowa Department of Natural Resources staff to discuss a proposed plan to reduce particulate emissions at our Muscatine, Iowa, facility and improve air quality levels throughout Muscatine. Two options were presented and an approximate time line for each was proposed at that meeting. At your request we broke down that plan to demonstrate the air quality impacts after each project phase was completed. A summary of the expected percentage change in PM2.5 concentrations resulting from implementation of each project phase was emailed to you on October 8.

It is the intent of GPC to reduce particulate emissions at our Muscatine, Iowa, facility and improve air quality levels throughout Muscatine in a timely and cost-efficient manner. Our presentation and subsequent analysis was a demonstration of our plans to do that. We look forward to continuing our work with IDNR to implement these plans as proposed to affect a timely solution to Muscatine's PM2.5 issues.

Sincerely,

Ron Zitzow
Senior Vice President Operations