Fields of Opportunities

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR
KIM REYNOLDS, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
CHUCK GIPP, DIRECTOR

April 8, 2013

Karl Brooks
Regional Administrator
U.S. Environmental Protection Agency Region VII
11201 Renner Blvd
Lenexa, KS 66219

Dear Regional Administrator Brooks:

In your letter to Iowa Governor Terry Branstad dated February 6, 2013, you stated your intention to designate all of Muscatine County as nonattainment for the 2010 1-hour sulfur dioxide (SO2) National Ambient Air Quality Standard. You requested that the Department of Natural Resources (DNR) provide any additional information it may have for the Environmental Protection Agency (EPA) to consider prior to EPA finalizing this action.

The DNR recommends that EPA revise their proposed nonattainment boundary as a subset of Muscatine County instead of the entire county. The attached document provides technical justification for this recommendation. The State of Iowa appreciates EPA's consideration of this information in the designations process.

If you have any questions on the enclosed recommendation and supporting information, please contact Jim McGraw at 515-242-5167, or by email at jim.mcgraw@dnr.iowa.gov.

Sincerely,

Chuck Gipp

Chuck Gipp
Director
Iowa Department of Natural Resources

Enclosure

cc: Catharine Fitzsimmons, DNR AQB, without enclosure
Jim McGraw, DNR AQB, without enclosure

Iowa's Alternative 1-hour SO_2 Nonattainment Boundary Proposal for Muscatine County

Summary

On February 6, 2013, the U.S. Environmental Protection Agency (EPA) informed the State of Iowa of their intent to designate Muscatine County nonattainment for the 2010 1-hour sulfur dioxide (SO_2) primary National Ambient Air Quality Standard (NAAQS). Included with EPA's notice of the nonattainment designation was a Technical Support Document (TSD) titled "Iowa Area Designations For the 2010 SO_2 Primary National Ambient Air Quality Standard" that provided a technical basis for EPA's preliminary nonattainment area proposal. EPA's technical analysis relied on the five factors included in the March 24, 2011 designations guidance memorandum from Stephen D. Page, Director, U.S. EPA, Office of Air Quality Planning and Standards, to state Air Directors. EPA has requested that the Iowa Department of Natural Resources (DNR) provide any additional information for EPA consideration prior to EPA taking action to finalize the nonattainment area proposal.

Based on the information summarized herein, the DNR recommends that EPA revise their proposed nonattainment boundary as a subset of Muscatine County instead of the entire county. This document provides an analysis of the meteorological conditions in the Muscatine area as well as a dispersion modeling analysis of the Muscatine area SO_2 emissions in support of this recommendation.

Meteorology

Meteorological data from the Davenport Automated Surface Observation System (ASOS) was chosen for this analysis. The Davenport data was chosen over data from the nearby Muscatine airport because of the high number of calms present in the Muscatine data (22.7%). The DNR has previously shown that the Davenport data are representative of the weather patterns in Muscatine County. The predominant wind directions at both locations are from the south and the northwest. The wind rose for Davenport is provided in Figure 1. A detailed analysis of the meteorological data is available in the "2005 - 2009 AERMOD Met Data Technical Support Document" on our website.

Wind data was analyzed during periods of observed 1-hour SO_2 exceedances between 8/27/2010 and 12/31/2012. This period includes all current quality-assured monitor exceedance days reported at any of the Muscatine area air quality monitors.

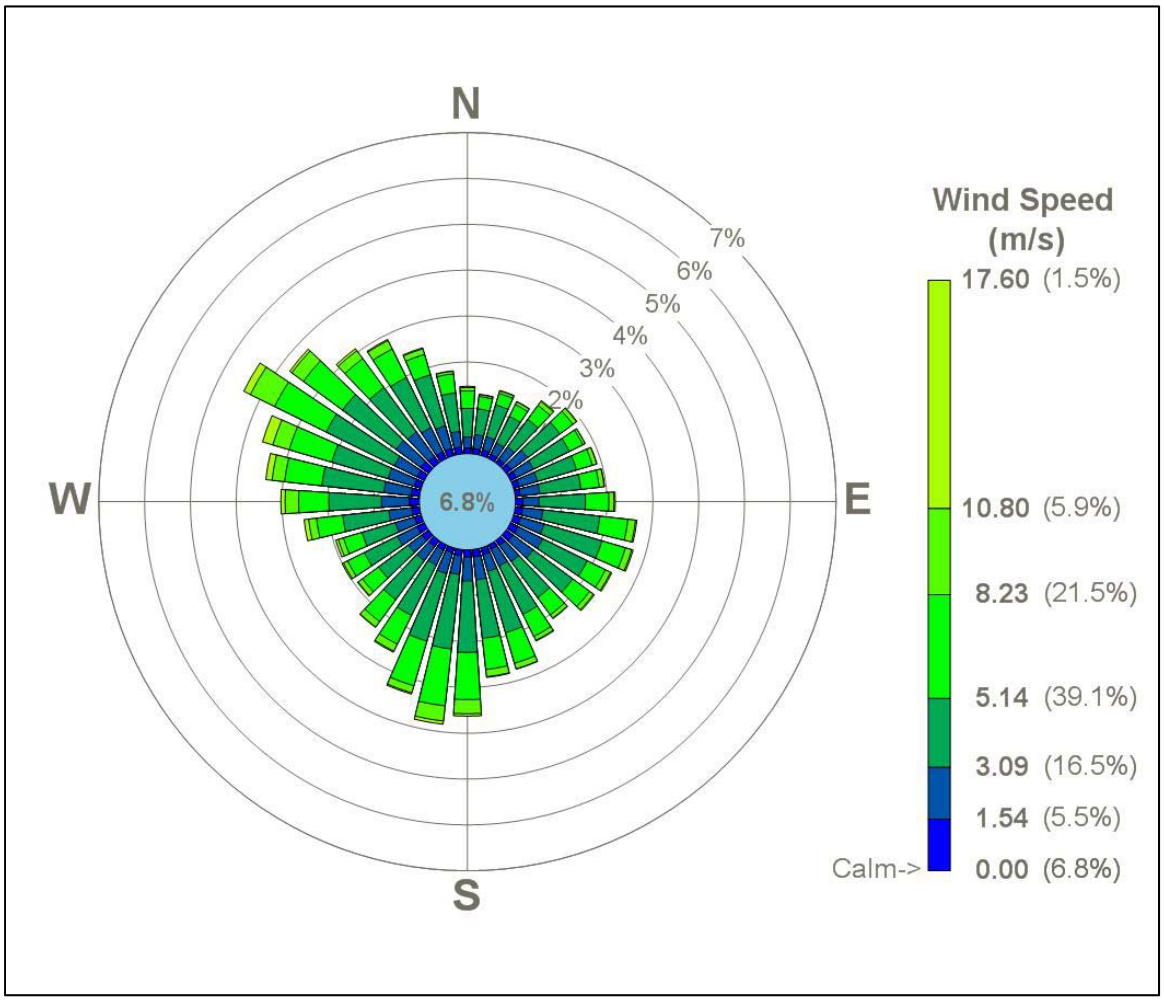

Figure 1. Wind rose for Davenport ASOS.

Wind roses were created for the exceedance days at each monitor. The wind roses include all available hours of wind data for each day when a predicted exceedance occurred. The winds are generally from the south on days when exceedances are observed at the air quality monitors at Musser Park and Greenwood Cemetery, and from the East on days when exceedances are observed at East Campus (formerly named "Garfield Elementary"). The wind roses are depicted in Figure 2.

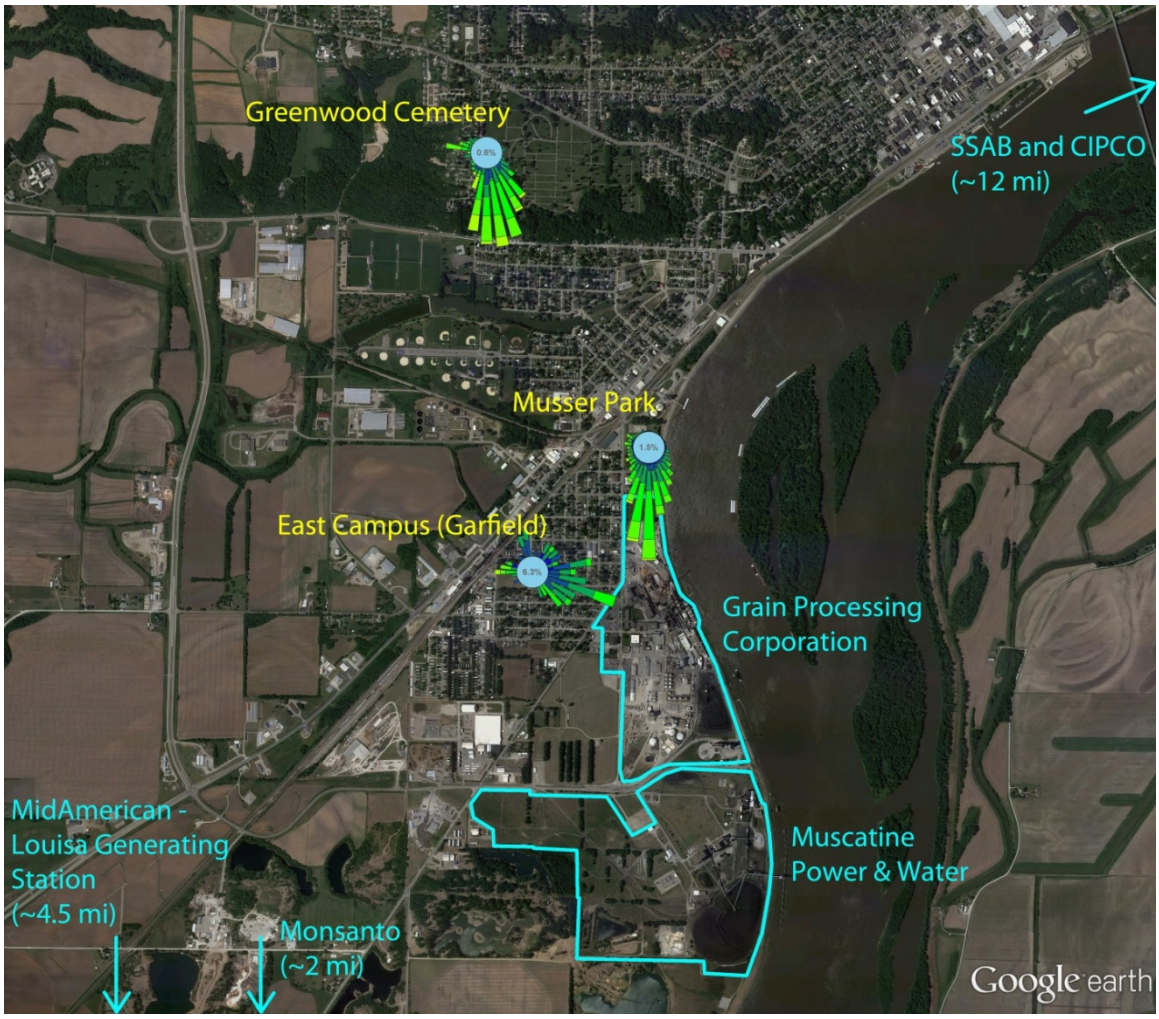

Figure 2. Wind roses on observed exceedance days (2010-2012).

The wind roses indicate that the SO_2 emissions causing the exceedances are originating in the industrial area along the Mississippi river on the south side of Muscatine. Due to the close proximity of the three monitors, it is likely that emissions from more-distant sources of SO_2 emissions will impact all three monitors on any day where a single monitor showed an exceedance. The lack of a southerly component at the East Campus monitor on exceedance days supports EPA's conclusion that the nonattainment area does not extend into Louisa County, where MidAmerican Energy's Louisa Generating

Station is located. Similarly, the lack of an easterly component at the Musser Park and Greenwood Cemetery monitors indicates that more-distant sources of SO_2 emissions to the East, such as SSAB and CIPCO, are also not contributing to the observed exceedances.

To further illustrate this point, the hourly wind data were paired with hourly SO_2 concentrations at the Musser Park monitor for four days with varying SO_2 concentrations and wind patterns (Figures 3-6). Figure 3 shows an increase in southerly wind speeds and Figure 4 show when the winds shifted from the east to the south. The SO_2 concentrations at the monitor increased when the wind speed or magnitude shifted to the south. Figures 5 and 6 depict days with consistently low SO_2 concentrations when the winds were out of the north or east all day.

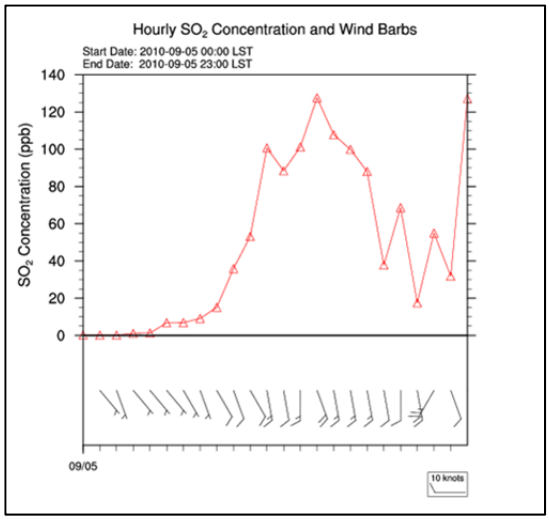

Figure 3. Increased Southerly Wind Speeds

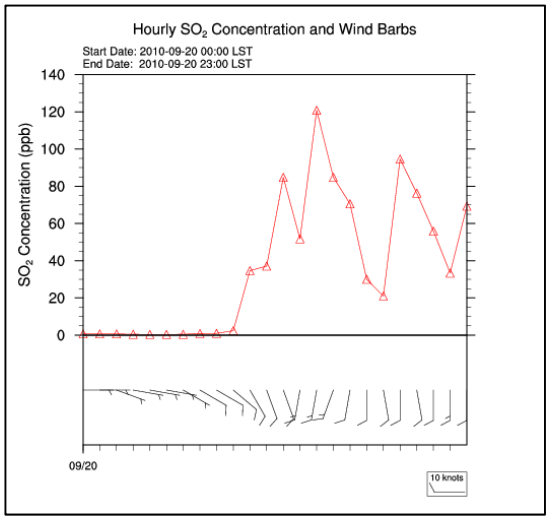

Figure 4. Winds Shifted from E to S

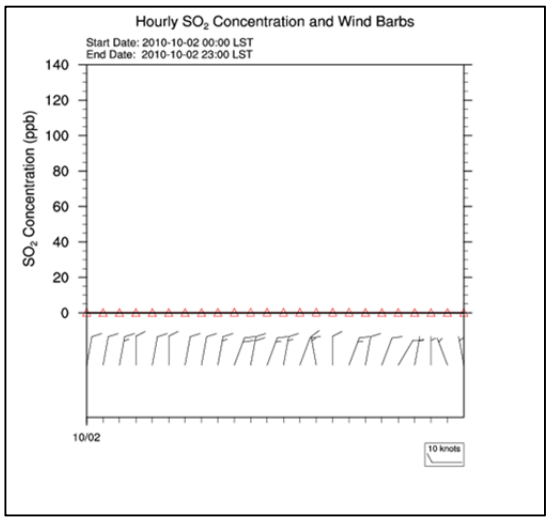

Figure 5. Wind Direction: N

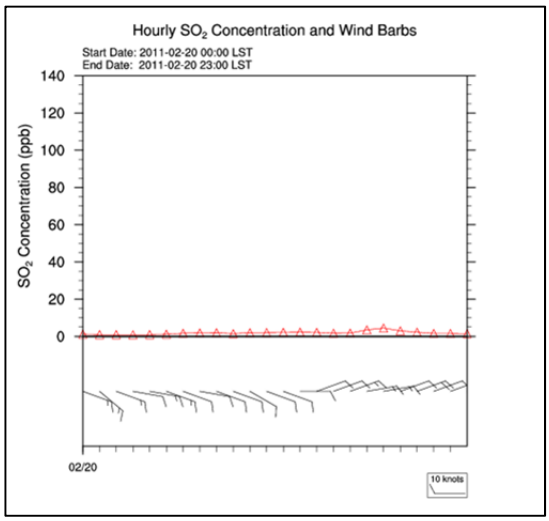

Figure 6. Wind Direction: E

Dispersion Modeling

A modeling analysis was conducted using the most recent version of EPA's regulatory dispersion model, AERMOD (version 12345), National Elevation Dataset (NED) terrain elevations, and building downwash parameters for all point sources. Meteorological data from the Davenport ASOS site for the period 2005-2009 were used. The following major sources of SO_2 were included in the analysis, and were modeled using actual SO_2 emission rates from 2009-2010.

- Grain Processing Corporation (GPC)
- Muscatine Power & Water (MPW)
- Monsanto
- MidAmerican Energy – Louisa Generating Station (LGS)
- Central Iowa Power Corporation – Fair Station (CIPCO)

Two other major sources in Muscatine County were screened out of the analysis because they were either too far away or their reported actual emissions were too low. These include Gerdau Ameristeel (12.3 miles, 2 tons) and SSAB (13.4 miles, 219 tons). Based on this information, it was determined that refined 1-hour SO_2 inventories would not be necessary since impacts from these facilities would not likely influence the boundary determination.

Hourly SO_2 emission rates were determined for the five included facilities. The inventories for each facility were based on a review of their 2009 and 2010 Title V EIQs to determine which sources were reported to have SO_2 emissions and also to determine which sources were operating. If it was determined that a source did not operate during 2009 and 2010, the 1-hour SO_2 emission rate was set to zero in the model, since it would not have contributed to monitored exceedances.

The emission rates used for each facility are provided in the attached excel spreadsheets (listed below) and the notes field for each emission point provides the specific explanation of how the emission rate was derived.

- MidAm-Louisa SO2_2009-2010.xls
- GPC SO2_2009-2010.xls
- Monsanto SO2_2009-2010.xls
- MPW SO2_2009-2010.xls
- CIPCO-Fair Station SO2_2009-2010.xls

In general, the emission rates were based on the maximum capacity of the unit and the appropriate AP-42 emission factor. In cases where stack test data was available for the

emission point or a similar emission point, the highest run was used as the 1-hour emission rate. For sources with a SO_2 continuous emissions monitor (CEM) where there was no 1-hour data set immediately available to the department, the emission rate was based on the maximum emission rate during any one 20-minute run during any relative accuracy test audits (RATA) completed in the last three years. For GPC, some of the emission rates were based on sampling completed with a hand-held SO_2 analyzer.

For the units that are required to report 1-hour SO_2 CEM data to EPA's Clean Air Markets Division (CAMD) website, emission rates were based on a statistical analysis of the 99th percentile confidence interval of maximum 1-hour SO_2 measured emissions in the 2009 and 2010 data supplied to the website. Of these units, where 2010 emissions were significantly lower than 2009 emissions the reduction was assumed to be an ongoing effect of the Clean Air Interstate Rule (CAIR) and only 2010 data was considered in determining the 1-hour SO_2 emission rate.

The 99^{th} percentile confidence interval was chosen following the recommendations of EPA in the March 1, 2011 memo "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1 -hour NO_2 National Ambient Air Quality Standard." As stated in this memo, EPA believes the most appropriate data to use for compliance demonstrations for the 1-hour NO_2 NAAQS are those based on emissions scenarios that are **continuous enough or frequent enough** [emphasis added] to contribute significantly to the annual distribution of maximum daily 1-hour concentrations. Although the referenced guidance in this memo is for nitrogen dioxide (NO_2) permit modeling, the common 1-hour averaging time and form of both the NO_2 and SO_2 standards makes this modeling guidance applicable to the 1 -hour SO_2 NAAQS and, thus, applicable to SO_2 modeling in support of designations. The department felt upon analysis of the data that the 99^{th} percentile confidence interval met that intent of EPA's guidance.

In addition, there is the potential that some sources of SO_2 emissions at GPC are currently not included in the modeling analysis. For point sources, GPC has not provided any inventory information regarding SO_2 emissions for feed or gluten dewatering, steepwater and millwater transfer operations and wet feed loading operations. There is also a possibility for uncaptured SO_2 emissions from the process lines including wall vent emissions from the wet milling operations, steep evaporators, and dryer houses 1, 2, 3, 4 and gluten plants 1 and 2. The department expects that any additional SO_2 sources not currently included in the modeling are small sources and would likely only increase fence line concentrations around GPC and not increase the extent of the modeled

NAAQS exceedances. Any additional SO_2 emissions that are found to exist at the facility will be included in future refinements to the modeling analysis.

To provide a current picture of air quality in the area, several changes already in operation at the modeled facilities since 2010 were also included in the analysis:

- GPC
    - The following sources were removed: EP103.0, EP104.0, EP542.0, and EP543.0.
    - The stack height for EP195.0 was increased to 66.5 feet.
    - Two new sources were added: EP546.0 and EP548.0.
    - The emissions from EP551.0 were changed from internally-venting to a point source.
- Monsanto
    - The following source was removed: EP125.0.

Two modeling analyses were conducted: a culpability test of the impact of each facility at the Musser Park monitor location, and a full grid analysis to determine the extent of the predicted exceedances.

Musser Park Monitor Exceedance Culpability

The results of the culpability analysis indicated that both LGS and CIPCO were insignificant at every predicted exceedance at the Musser Park monitor location. The maximum contributions from these facilities to any predicted exceedance at the monitor location are summarized in Table 1.

Table 1. Maximum Contribution to Predicted Exceedances at Musser Park

Facility	**Maximum Exceedance Contribution** (ppb)	**Significance Level*** (ppb)
LGS	1.67	3
CIPCO	0.30	

* The 1-hour SO_2 SIL has not been formally proposed. The SIL listed above reflects the interim SIL of 3 ppb presented in the U.S.EPA Memo, *Guidance Concerning the Implementation of the 1-hour SO_2 NAAQS for the Prevention of Significant Deterioration Program*, August 23, 2010.

These results, combined with the predominant wind directions observed on monitor exceedance days, support the exclusion of these sources from the nonattainment area. In addition, CIPCO is scheduled to shut down in September 2013. For these reasons, CIPCO was excluded from the full grid analysis. While LGS also had an insignificant

impact it was still included in the full grid analysis because of its proximity to the Musser Park monitor.

Full Grid Analysis

A receptor grid was centered on the Musser Park monitor location and extended out to cover EPA's entire presumptive nonattainment area. Receptors that fell outside of the presumptive nonattainment area were omitted from the analysis. Receptor spacing varied as follows:

- 0-0.5 km: 50-meters
- 0.5-1.5 km: 100-meters
- 1.5-3 km: 250-meters
- 3-10 km: 500-meters
- 10+ km: 1,000-meters

A default background concentration of 12.22 ppb was added to the results of the analysis. This background value is the average 2009-2011 design concentration for monitors located in Cedar Rapids, Davenport, Des Moines, and Lake Sugema, and is the default 1-hour background used for New Source Review modeling analyses in Iowa.

The department's review of the modeling analysis identifies that the combined emissions from the modeled sources will result in predicted exceedances of the 1-hour SO_2 NAAQS over an area extending approximately 8-12 kilometers from the Musser Park monitor, depending on the direction. This represents a smaller area (approximately one third) than EPA's presumptive boundary.

Proposed Nonattainment Boundary

Based on the information summarized herein, the DNR recommends that EPA revise their proposed nonattainment boundary as a subset of Muscatine County instead of the entire county.

Figure 7 identifies the suggested nonattainment boundary (green), township lines (orange), and section lines (light blue). Major roads and highways are labeled for ease of identification. The suggested nonattainment boundary is contained within Muscatine County and uses jurisdictional boundaries clearly defined by townships and section numbers. Table 2 provides the legal definition of the suggested nonattainment boundary (T=Township, R=Range, it takes both to define the township).

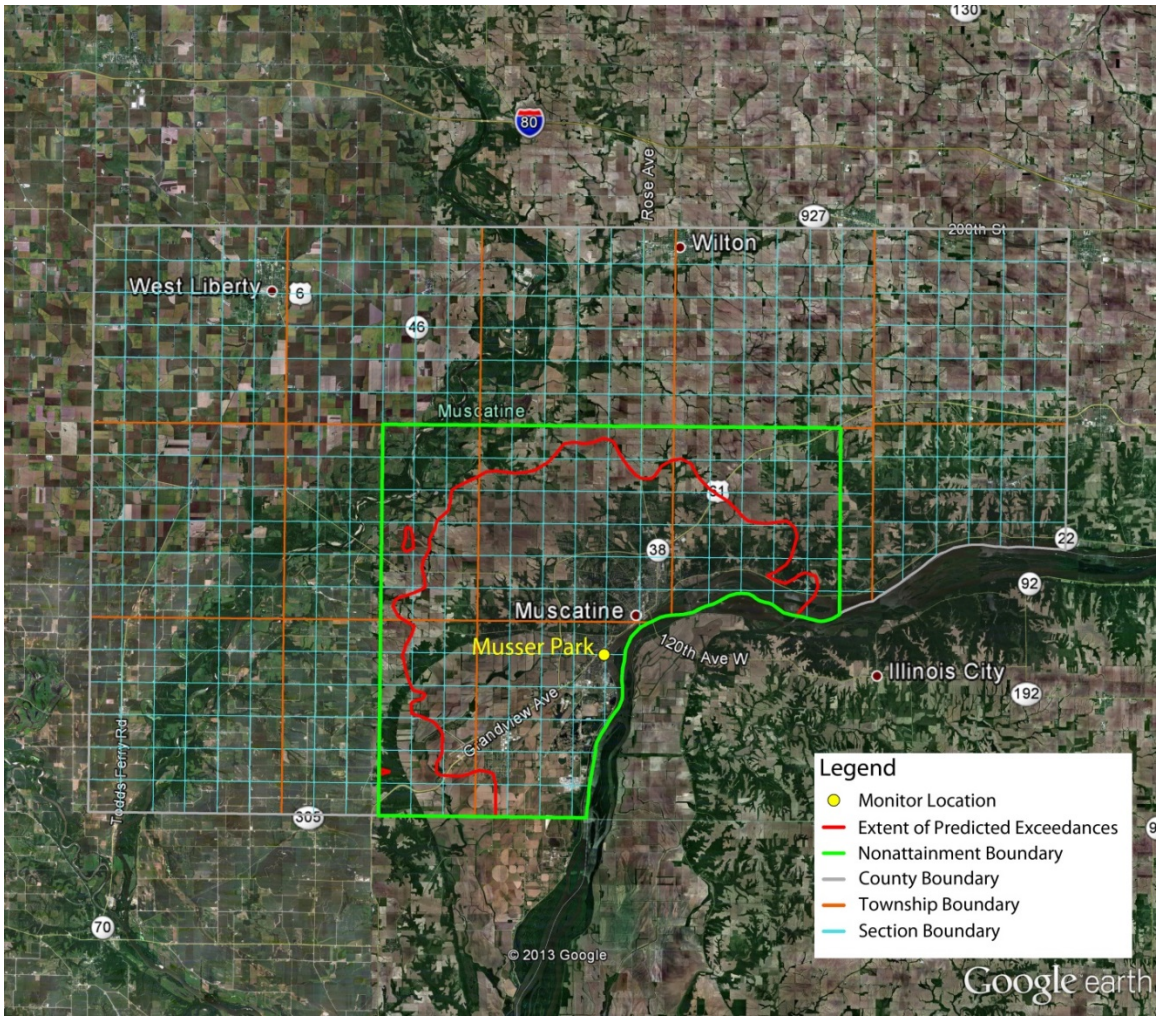

Figure 7. DNR Proposed Nonattainment Boundary.

Table 2. Legal Description of Iowa DNR Proposed Nonattainment Area.

Township	**Sections**
T77N R3W (Lake township)	1-3, 10-15, 22-27, 34-36
T76N R3W (Seventy-six township)	1-3, 10-15, 22-27, 34-36
T77N R2W (Bloomington township)	All
T76N R2W (Fruitland township)	All
T77N R1W (Sweetland township)	All except 1, 12, 13, 24, 25, 36

Public Comments

Two public meetings were held in Muscatine, IA, on March 28, 2013, at the Muscatine County Conservation Board's Environmental Learning Center. The purpose of the meetings was to obtain public input on DNR's proposed nonattainment boundaries. A combined total of approximately 50 people attended the two meetings.

Oral comments received during the meetings were supportive of the DNR's proposed nonattainment boundaries. No specific alternative boundaries to DNR's recommendation were received at the meetings.

One written comment was received during the public meetings. The commenter did not provide suggestions regarding nonattainment boundaries but instead commented on general air quality conditions in the area.

One written comment was received subsequent to the public meetings. The commenter urged EPA and DNR to set boundaries that will result in clean air as quickly as possible but offered no specific recommendations regarding the nonattainment boundaries.

Thirteen (13) written comments were received by DNR regarding EPA's presumptive 1-hour SO_2 nonattainment area. Five commenters were supportive of EPA's presumptive county wide boundary. Two commenters suggested a sub-county area but provided no details regarding boundaries. Three commenters suggested that DNR request a deferral of the nonattainment designation and instead pursue a State Implementation Plan (SIP) call similar to fine particulate matter (PM2.5). Two of the three commenters in this group also requested that if a SIP call could not take the place of a nonattainment designation then alternatively the nonattainment area boundaries should be drawn as narrowly as possible. The three remaining commenters offered no suggestions regarding nonattainment boundaries but instead commented on general air quality conditions in the area.

All written comments are available from the DNR upon request.