Iowa
State Implementation Plan

1-Hour SO_2 Nonattainment
Muscatine, Iowa

Iowa Department of Natural Resources
Environmental Services Division
Air Quality Bureau
7900 Hickman Rd Suite 1
Windsor Heights, IA 50324

May 17, 2016

Executive Summary

Sulfur dioxide (SO_2), a colorless gas with a strong odor, is harmful to human health and is one of six common air pollutants regulated by the U.S. Environmental Protection Agency (EPA) using National Ambient Air Quality Standards (NAAQS). On June 22, 2010, the EPA published in the Federal Register a revision to the primary SO_2 NAAQS (75 FR 35519) that established a new short-term standard designed to provide increased health protections for sensitive individuals against SO_2's adverse impacts upon the respiratory system. EPA revised the primary SO_2 NAAQS by setting a new 1-hour (hr) standard at a level of 75 parts per billion. The form of the new standard is the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hr average concentrations.

Following any NAAQS revision Section 107(d) of the federal Clean Air Act (CAA) requires that states and EPA complete a designations process. An area that EPA has determined does not meet the standard, or an area that contributes to a nearby area not meeting the standard, is classified as a nonattainment area. In 2013 EPA designated a portion of Muscatine County as a nonattainment area based on ambient air quality data and recommendations from the State of Iowa. The nonattainment designation was published in the Federal Register on August 5, 2013, (78 FR 47191) with an effective date of October 4, 2013.

The CAA requires any state with a nonattainment area to submit to EPA a State Implementation Plan (SIP) revision that demonstrates how the area will attain the NAAQS. According to Section 192(a) of the CAA, the SO_2 NAAQS must be achieved as quickly as possible and no later than 5 years after the effective date of the designation. The attainment date for the Muscatine 1-hr SO_2 nonattainment area is no later than October 4, 2018.

The Iowa Department of Natural Resources (DNR) developed a control strategy that establishes new and permanent restrictions on SO_2 emissions from sources at three facilities within the nonattainment area: Grain Processing Corporation, Muscatine Power & Water, and Monsanto Company. Emission reductions and air quality improvements will be obtained from these facilities using control measures made enforceable through air construction permits. The implementation of process modifications, new control equipment, and more stringent SO_2 emission limits will ensure attainment and maintenance of the 1-hr SO_2 NAAQS as expeditiously as practicable by the October 4, 2018, attainment date.

The control strategy for the Muscatine 1-hr SO_2 nonattainment area, and other associated elements of this SIP revision, are designed to fulfill all the applicable requirements, including those of Section 172(c) of the CAA. The control strategy is permanent, enforceable, and includes the reasonably available control technology (RACT)/reasonably available control measures (RACM) necessary for expeditious attainment of the NAAQS. Additionally, the SIP revision includes contingency measures that can be implemented quickly if the 1-hr SO_2 NAAQS is not attained or if reasonable further progress requirements are not met. However, the use of contingency measures is unlikely based on the attainment demonstration that includes dispersion modeling analyses that support the effectiveness of the control strategy.

Contents

1. Introduction

On August 5, 2013, the U.S. Environmental Protection Agency (EPA) issued a final rule (78 FR 47191) designating a portion of Muscatine County, Iowa, as a nonattainment area for the 1-hour (hr) sulfur dioxide (SO_2) National Ambient Air Quality Standard (NAAQS). The federal Clean Air Act (CAA) requires any state with a nonattainment area to submit to EPA a State Implementation Plan (SIP) revision that demonstrates how the area will attain the NAAQS. Per section 192(a) of the CAA, the SO_2 NAAQS must be attained as quickly as possible and no later than 5 years after the effective date of the designation. The nonattainment designation for the area in Muscatine County became effective on October 4, 2013, and therefore the 1-hr SO_2 NAAQS must be achieved no later than October 4, 2018. The Iowa Department of Natural Resources (DNR) developed this nonattainment SIP[1] and the associated control measures to satisfy that and all other applicable nonattainment SIP requirements.

1.1. SO_2 National Ambient Air Quality Standards

Sulfur dioxide, a colorless gas with a strong odor, is harmful to human health and is one of six common air pollutants regulated by EPA using NAAQS. On June 22, 2010, EPA published in the Federal Register a revision to the primary[2] SO_2 NAAQS (75 FR 35519), establishing a new short-term standard to provide increased health protections for sensitive individuals against SO_2's adverse effects upon the respiratory system. EPA revised the primary SO_2 standard by setting a new 1-hr standard at a level of 75 parts per billion (ppb). The form of the standard is the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hr average concentrations. EPA did not revise the secondary standard as part of that review. The SO_2 NAAQS are summarized in Table 1-1.

Table 1-1. Summary of the SO_2 national ambient air quality standards.

NAAQS	Averaging Time	Level *	Form
Primary	1-hour	**75 ppb** (196 µg/m^3)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
Secondary	3-hour	**0.5 ppm** (1300 µg/m^3)	Not to be exceeded more than once per year
Primary +	24-hour	**0.14 ppm** (365 µg/m^3)	Not to be exceeded more than once per year
Primary +	annual	**0.030 ppm** (80 µg/m^3)	Not to be exceeded

* The µg/m^3 values are informational only, the SO_2 standards are defined in 40 Code of Federal Regulations (CFR) 50 using parts per million (ppm) and parts per billion (ppb).

\+ The 24-hr and annual average SO_2 primary NAAQS will be revoked in an area once the applicable provisions of 40 CFR 50.4(e) are met.

1.2. Designations

Following a NAAQS revision, Section 107(d) of the CAA requires that states and EPA complete a designations process. Within one year of the NAAQS revision states must submit designation recommendations to EPA. Only EPA has the authority to issue designations and they generally must do so within two years of a NAAQS revision, although a 1-year extension is available to EPA if sufficient information is not available.

[1] While technically a SIP revision, for simplicity this document is often referred to as a nonattainment SIP.

[2] Primary NAAQS are criteria established by EPA that set limits on air pollution necessary to protect human health with an adequate margin of safety. Secondary NAAQS protect public welfare (public welfare protections consider, for example, effects on soils, water, crops, vegetation, man-made materials, animals, wildlife, and visibility). EPA only revised the primary standard in the 2010 SO_2 NAAQS revision.

Based on air quality monitoring data and recommendations from the State of Iowa EPA designated a portion of Muscatine County as a nonattainment area, effective October 4, 2013 (78 FR 47191, August 5, 2013). EPA did use the 1-year extension provisions allowed for by the CAA and explained in 77 FR 46295 (August 3, 2012) that the extension was appropriate given uncertainty regarding the overall analytic approach (*e.g.* modeling or monitoring) to determining initial designations for all other areas in the U.S. To date, EPA has not yet finalized 1-hr SO_2 designations for the remainder of the state.

1.3. Description of the 1-Hour SO_2 Nonattainment Area

Muscatine County is located in eastern Iowa and borders the Mississippi River (see Figure 1-1). The 1-hr SO_2 nonattainment area encompasses approximately 126 square miles and includes the incorporated cities of Muscatine and Fruitland, as shown in Figure 1-2. The extent of the nonattainment area is defined in the Code of Federal Regulations (CFR) at 40 CFR 81.316 using the sections and townships listed in Table 1-2 (and depicted in Figure 1-3).

Table 1-2. Summary of the legal description of the 1-hr SO_2 nonattainment area in Muscatine County.

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

Population estimates for the city of Fruitland, the city of Muscatine, and Muscatine County are 977, 23,888, and 42,903, respectively.[3] Topography within the nonattainment area includes regions that are relatively flat, such as the floodplain, and regions with more diverse geographical features, such as bluffs, river and creek valleys, and ravines (see Figure 1-4). The floodplain covers most of the southern portion of the nonattainment area and sits behind levees on the western bank of the Mississippi River. The floodplain is approximately three meters above the Mississippi River and is confined by bluffs that rise approximately 40-60 meters above the river.[4] The city of Fruitland covers ~2 square miles and is located entirely within the floodplain in southern Muscatine County. The city of Muscatine extends northeastward from Fruitland and covers ~18 square miles.

Land use within the nonattainment area primarily includes a mix of agricultural, residential, commercial, and industrial applications. The western and northern regions of the nonattainment area are generally rural. Within the city of Muscatine, land use in the area of the floodplain (from the bluff line to approximately three kilometers (km) south of the bluffs and lying within ~1.5 km of the Mississippi River) includes a mix of industrial sites, commercial sites, residential housing, and supporting infrastructure and amenities (schools, parks, etc.). Two of the three facilities that emit significant amounts of SO_2 (Grain Processing Corporation and Muscatine Power & Water) are located in this region and are close to the Mississippi River. The third facility (Monsanto) is situated in the southeastern portion of Muscatine County, near the Mississippi River and east of the city of Fruitland. There are no SO_2 sources within the city Fruitland.

[3] U.S. Census Bureau, vintage 2014 data, population estimates as of July 1, 2014.

[4] For dispersion modeling purposes the terrain is not significantly influencing wind fields in this area because the height of the bluffs above the floodplain is generally less than 60 meters (Alyssa Fizel and Brad Ashton*, Quantifying Terrain Influence on Wind for Dispersion Modeling,* Technical Support Document, Iowa DNR, January 27, 2015).

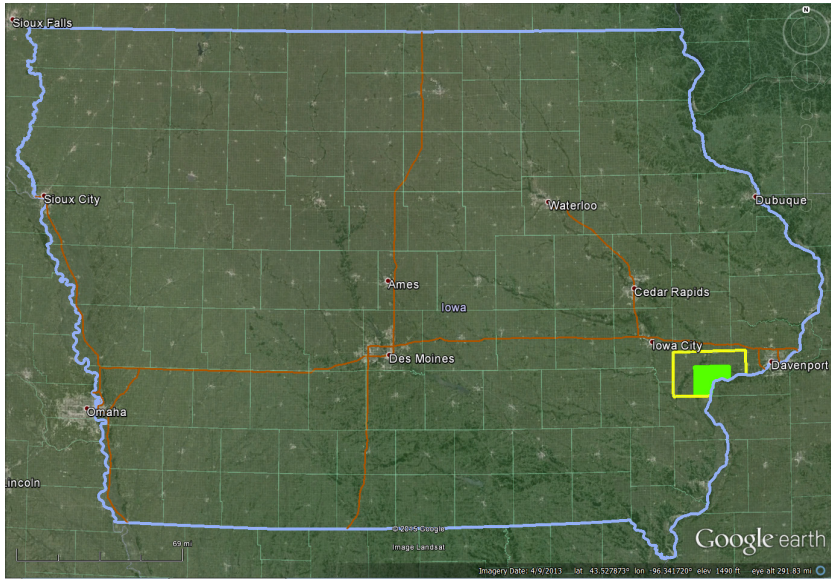


Figure 1-1. Statewide reference map showing the nonattainment area (solid green) within Muscatine County (outlined in yellow), Iowa.

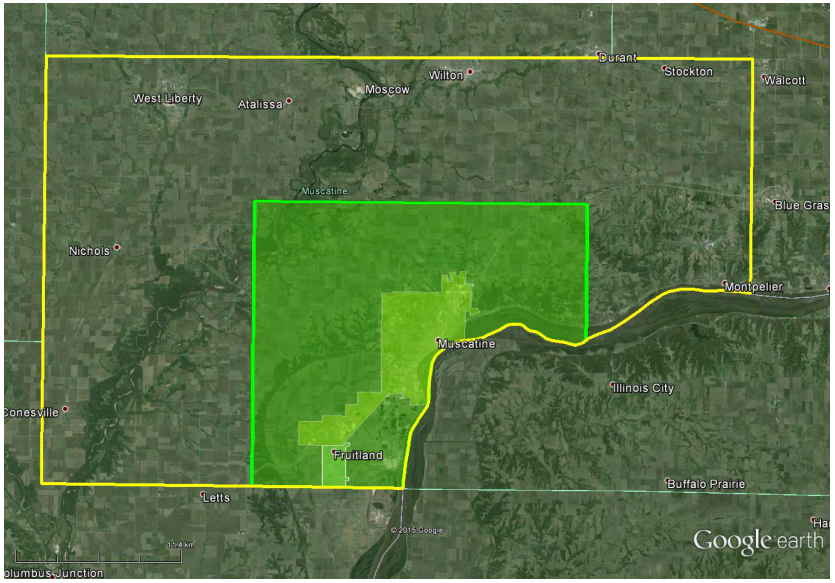


Figure 1-2. Depiction of the nonattainment area (green; city limits within also shaded) in Muscatine County. I-80 crosses at the upper right.

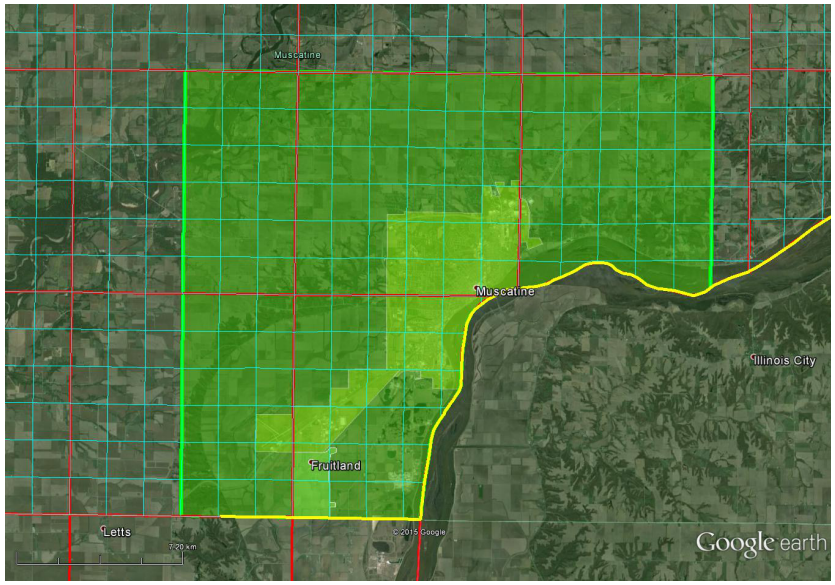


Figure 1-3. Overlay of the township (red) and section (light blue) lines in and near the nonattainment area. Incorporated city limits are again shaded.

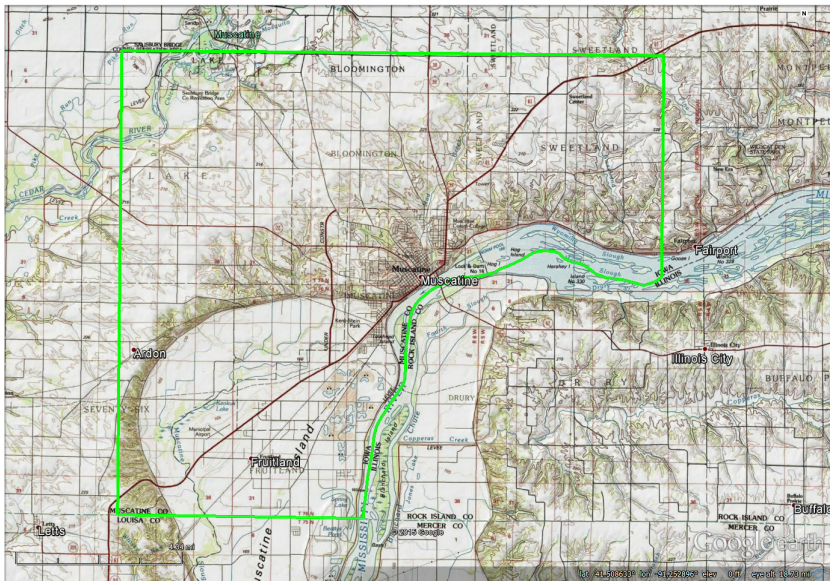


Figure 1-4. Topographical features within the vicinity of the nonattainment area (bounded in green).

1.4. Summary of Air Quality Data

The DNR measures ambient SO_2 concentrations at three sites within the nonattainment area. The sites are listed in Table 1-3 and their approximate locations are shown in Figure 1-5. Each monitor is sited within the city limits of Muscatine. The Musser Park and High School East Campus monitors are located in the floodplain while the Greenwood Cemetery monitor is situated north of the bluff line. Figure 1-6 depicts the monitoring locations in more detail.

Table 1-3. Sulfur dioxide monitoring locations within the nonattainment area.

Site Name	Site ID	SO_2 Monitor Start Date
Musser Park	19-139-0020	December 11, 1989
Greenwood Cemetery	19-139-0016	January 1, 2012 *
High School East Campus	19-139-0019	August 1, 2012

* Ambient SO_2 monitoring at Greenwood Cemetery began in the early 1980s but was suspended at the end of 2007. At that time measured SO_2 concentrations were low in comparison to the NAAQS. Monitoring resumed in January 2012 and only the most recent start date is listed in this table.

Determining the attainment status of an area using ambient air monitoring data involves the calculation of a metric called a design value. Computing a design value for the 1-hr SO_2 NAAQS requires three years of data because the form of the standard is a 3-year average (of the 99th percentile of the annual distribution of daily maximum 1-hr average concentrations). During the designations process timeframe only the Musser Park monitor had been in operation for at least three years. Although data from the Musser Park monitor between approximately September 30, 2008, and August 20, 2010, was voided[5] and a design value meeting the completeness criteria of 40 CFR Part 50 Appendix T could not be calculated at the time of designation, EPA used the available 2009-2011 Musser Park data and the provisions in 40 CFR 50 Appendix T 3(d)[6] to determine that the area did not meet the 1-hr SO_2 standard.

During the designations process the 2011 ambient monitoring data was the most recent evaluated by EPA. Design values calculated using certified data from 2011 through 2014 are included in this review. While three years of certified data are not available from the High School East Campus monitoring site during this span, two design values from the Musser Park data can be calculated (2011-2013 and 2012-2014) and one from the Greenwood Cemetery data (2012-2014). All three design values are over the 1-hr SO_2 NAAQS, as shown in Table 1-4. Additional review of the 2011-2014 monitoring data is provided in Appendix A.

Table 1-4. Recent 1-hr SO_2 design values in Muscatine and the associated 99th percentile of the annual distribution of daily maximum 1-hr average SO_2 concentrations. All values are in parts per billion (ppb).

Monitor Location	1-hr SO_2 NAAQS (ppb)	Design Values (ppb)		99th Percentile Daily Max 1-hr SO_2 Concentrations (ppb)			
		2011–2013	2012–2014	2011	2012	2013	2014
Musser Park	75	217	194	247.9	224	178.5	179.7
Greenwood Cemetery			101		104.2	83.7	116.5

[5] Due to calibration materials that were improperly certified by the vendor.

[6] The provisions of 40 CFR 50 Appendix T 3(d) allow "the Administrator of EPA to consider other factors, such as consistency and levels of the valid concentration measurements that are available for the purpose of establishing a design value covering a monitor's 3 years of operation." (EPA, 2013. *Technical Support Document (TSD), Iowa, Area Designations for the 2010 SO_2 Primary National Ambient Air Quality Standard.)*

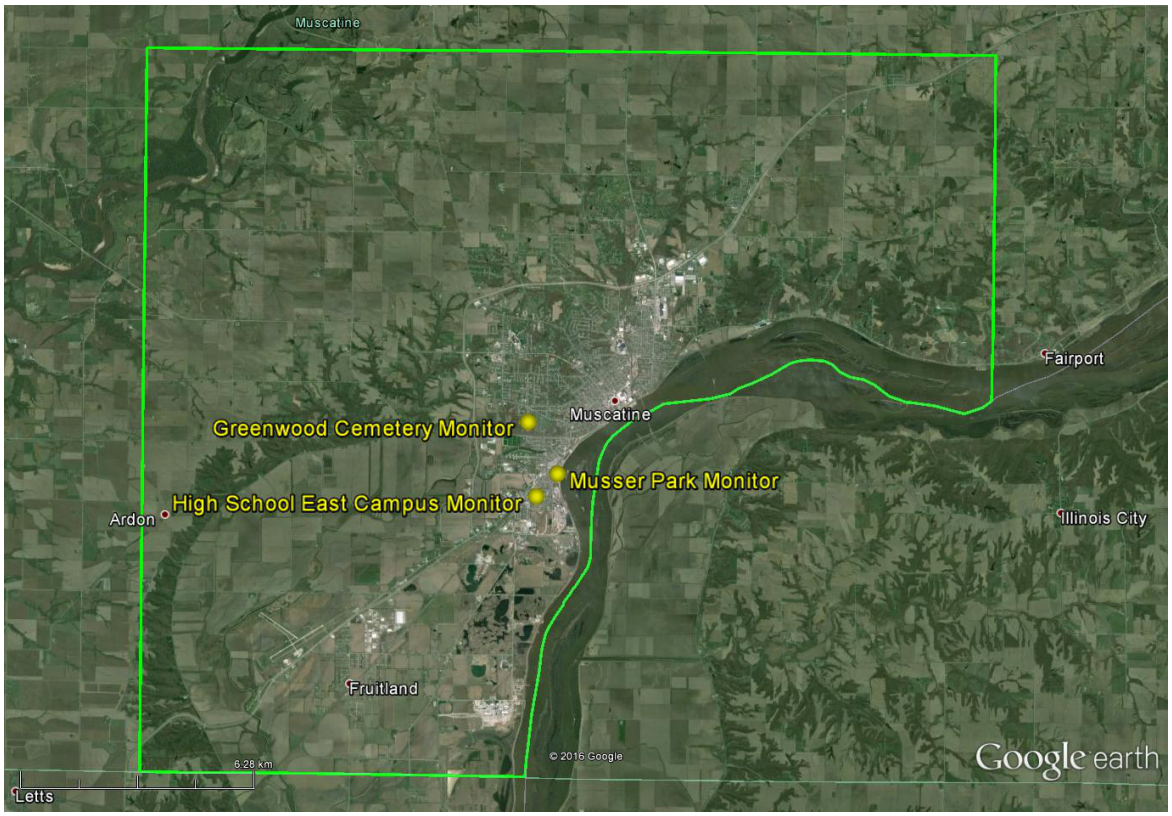


Figure 1-5. The three SO_2 monitoring locations within the nonattainment area.

Figure 1-6. Additional image of the SO_2 monitoring locations; all are within the city of Muscatine.

1.5. Affected Sources

Three facilities within the nonattainment emit a significant amount of SO_2: Grain Processing Corporation (GPC), Muscatine Power & Water (MPW), and Monsanto Company (Monsanto). The approximate locations of these facilities are shown in Figure 1-7.

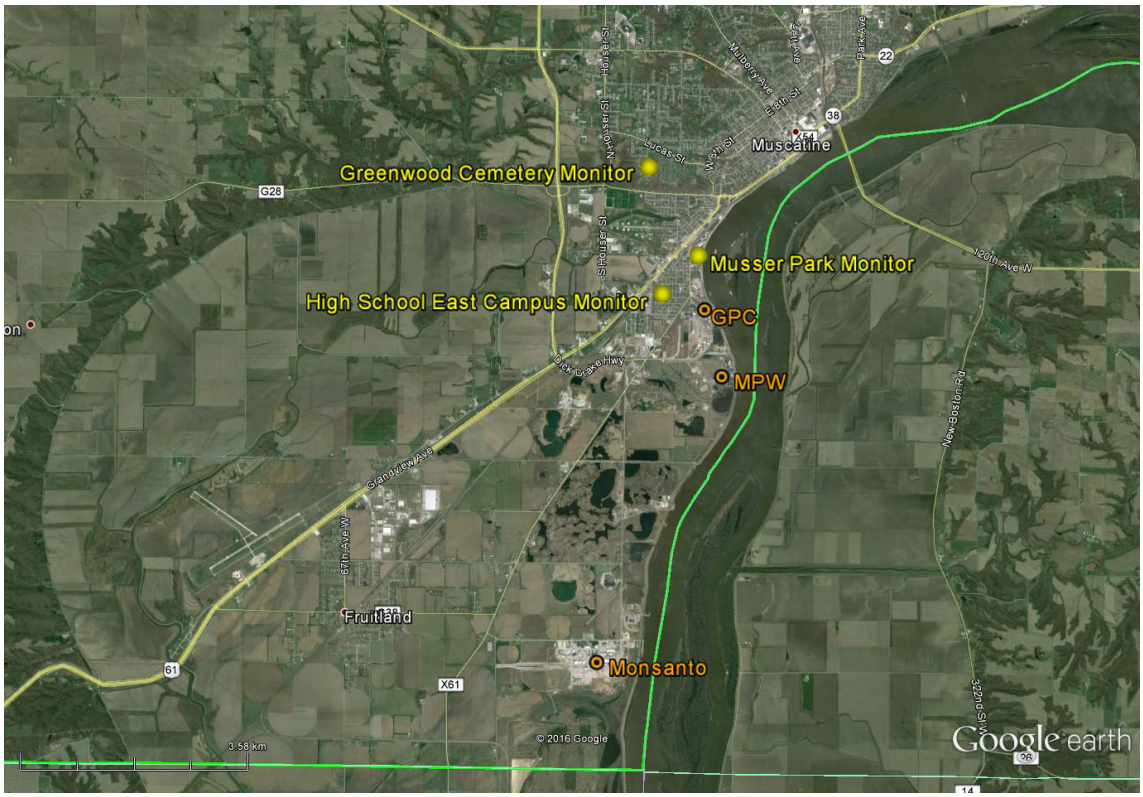


Figure 1-7. Facility and SO_2 monitor locations (in the SE portion of the nonattainment area).

Grain Processing Corporation

Grain Processing Corporation (GPC) is the largest source of SO_2 within the nonattainment area. GPC is a corn wet milling facility that processes grain into industrial, beverage, and fuel-grade ethanol, as well as a variety of grain based food products, industrial products, and animal feeds. Early in the corn wet milling process the grain is soaked (steeped) in large tanks where sulfur containing compounds are added to the steep water to reduce bacterial growth and help break down the kernels. The sulfur content in the steep water is generally low but does lead to SO_2 emissions from a variety of downstream processes. While the majority (96%) of the SO_2 emissions at GPC is generated by six coal-fired boilers, a comprehensive SO_2 emissions inventory for GPC involves a sizeable list of diverse sources situated within a relatively large facility.

The northern edge of the facility is located approximately 250 meters south of the Musser Park monitor between the western bank of the Mississippi River and Oregon Street. From there the facility extends southward approximately 1350 meters while following the contours of the Mississippi River eastward. The facility's footprint as depicted in Figure 1-8 roughly identifies areas where public access is restricted by GPC, for example by fencing, physical barriers, or surveillance (it does not necessarily represent property boundaries). Most of the SO_2 sources at GPC are generally located in the central to east-central to slightly north-central regions of the facility.

Figure 1-8. Spatial overview of GPC; shading loosely depicts facility extent for air quality purposes.

Muscatine Power & Water

Muscatine Power & Water (MPW) is a municipal electric generating station (power plant) located approximately 1.8 kilometers south/southeast of the Musser Park monitor (see Figure 1-9). MPW produces steam through the combustion of fossil fuels, generally coal, and uses the steam to produce electricity. The facility is located immediately adjacent to the Mississippi River just south of GPC. The largest sources of SO_2 are three coal-fired boilers, Units 7, 8, and 9, serving generators with nameplate capacities of 25, 93[7], and 175.5 megawatts (MW), respectively. An auxiliary boiler is not capable of burning coal but has the potential to emit SO_2 when firing on distillate fuel oil.

Monsanto

Monsanto Company (Monsanto) is a manufacturer and formulator of herbicides for agricultural use. Monsanto also produces intermediates for herbicide manufacturing and formulation. The facility is located approximately 6.5 kilometers south/southwest of the Musser Park monitor and 0.5 kilometers west of the Mississippi River (see Figure 1-10). A coal-fired boiler (Boiler #8) used for the production of on-site heat and power is the largest SO_2 source at Monsanto.

[7] Unit 8 serves two generators (75 and 18 MW) with a combined capacity of 93 MW.

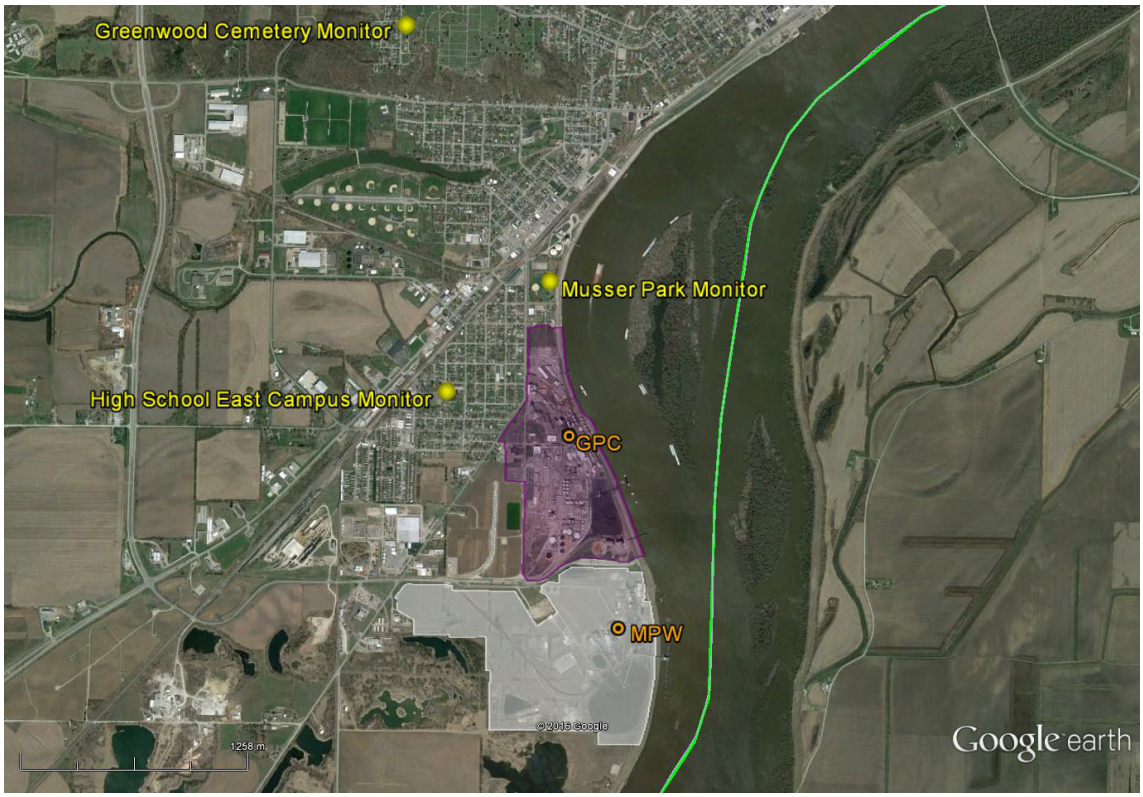


Figure 1-9. Spatial overview adding MPW (as before, shading defined for air quality purposes).

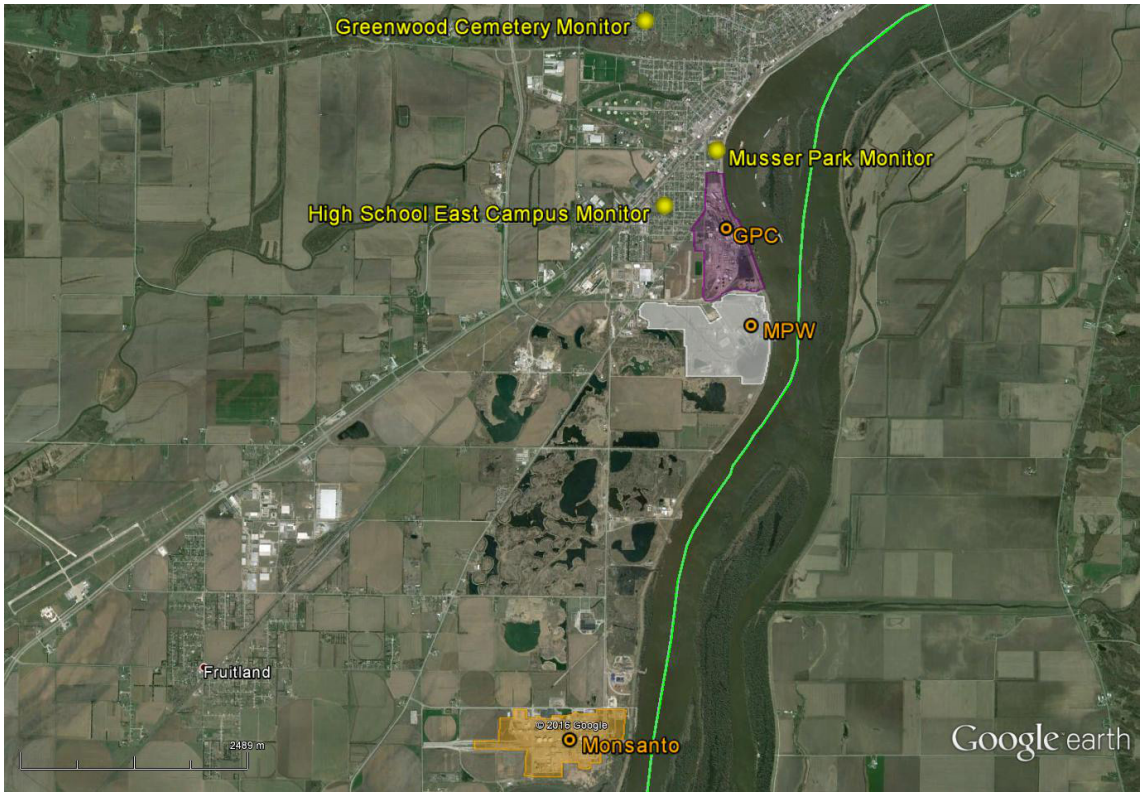


Figure 1-10. As above, with Monsanto added.

2. Nonattainment SIP Requirements

This SIP submittal is designed to fulfill the obligations of a 1-hr SO_2 nonattainment SIP. As discussed in more detail in the preamble to the final SO_2 NAAQS revisions (75 FR 35519, June 22, 2010) and EPA's *Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions* (April 23, 2014), the SO_2 nonattainment SIP must meet the requirements of Subpart 1 of Part D of the CAA, including those specified in Section 172(c), and Subpart 5 of Part D. The required plan elements in CAA §172(c) are summarized in Table 2-1. Additional details are provided in subsequent chapters.

Table 2-1. Summary of Clean Air Act §172(c) nonattainment SIP requirements. The SIP must:

§172(c)(1)	Provide for attainment and the timely implementation of all Reasonably Available Control Measures (RACM) & Reasonably Available Control Technologies (RACT).
§172(c)(2)	Address reasonable further progress (RFP) requirements (by appropriate emission reductions and implementation timelines).
§172(c)(3)	Contain a comprehensive, accurate, and current inventory of actual emissions.
§172(c)(4)	Identify and quantify emissions which will be allowed, in accordance with CAA §173(a)(1)(B), from the construction/operation of major new or modified stationary sources. Demonstrate such emissions will be consistent with RFP and the NAAQS.
§172(c)(5)	Include provisions to implement nonattainment new source review requirements.
§172(c)(6)	Contain a control strategy with schedules and timetables for compliance and enforceable emissions limits or other control measures necessary for the timely attainment of the NAAQS.
§172(c)(7)	Comply with the applicable provisions of CAA §110(a)(2).
§172(c)(8)	{The SIP may} use equivalent techniques for modeling, emissions inventory, or planning procedures (if no less stringent than any standard methods).
§172(c)(9)	Provide for the implementation of contingency measures if the area does not meet RFP or if the area does not attain the standard by the required attainment date.

Compilation of the emissions inventory occurred early in the SIP development process to help identify potentially important sources and inform control strategy development. The measures included in the control strategy (which incorporates RACT/RACM) consider implementation timeframes to ensure reasonable further progress (RFP) requirements are met and to ensure the 1-hr SO_2 NAAQS is attained as expeditiously as practicable. Section 192(a) of the CAA requires that the Muscatine area attain the 1-hr SO_2 standard within 5 years of the effective date of the nonattainment designation (which is by October 4, 2018).

The control strategy also includes enforcement methods, including procedures for monitoring compliance with the control strategy and addressing violations.[8] The attainment demonstration provides evidence that the control strategy is sufficient to achieve the 1-hr SO_2 NAAQS within the regulatory deadlines. The attainment demonstration was completed using air quality dispersion modeling conducted in accordance with Appendix W of 40 CFR 51 and applicable EPA guidance.

The state is demonstrating in this 1-hr SO_2 nonattainment SIP that it has met all applicable obligations, including applicable provisions listed in Table 2-1 and discussed above, and the necessary public participation requirements and the applicable administrative requirements in 40 CFR 51.

[8] Additional information regarding control strategy related requirements can be found in 40 CFR 51 Subpart G.

3. 2011 Baseyear SO_2 Emissions Inventory

A comprehensive, accurate, and current inventory of actual SO_2 emissions within the nonattainment area is a required component of the nonattainment SIP per CAA §172(c)(3). EPA's *Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions* (April 23, 2014) also mentions that the inventory should account for SO_2 emissions outside the nonattainment area that may affect attainment in the area.

The baseyear inventory establishes a baseline that is used to evaluate emissions reductions achieved by the control strategy and to assess reasonable further progress requirements. The most recent and available triennial inventory year is 2011 and this serves as a suitable and convenient baseyear. Within the nonattainment area three facilities are important from an SO_2 emissions perspective: Grain Processing Corporation, Muscatine Power & Water, and Monsanto. Their 2011 baseyear actual emissions are provided in Table 3-1. The majority (~97%) of the SO_2 emissions reported in Table 3-1 are directly measured using continuous emissions monitoring systems (CEMS). Coal combustion at each facility is the dominant source of SO_2 emissions.

Table 3-1. SO_2 actual emissions for the 2011 baseyear.

Facility	Facility ID	2011 SO_2 Emissions (tons)
Grain Processing Corporation	70-01-004	10,809.9
Muscatine Power & Water	70-01-011	2,374.4
Monsanto	70-01-008	537.3
	Total	**13,721.6**

Other Sources

MidAmerican Energy Company's Louisa Generating Station (LGS) is a coal-fired electric utility located outside the nonattainment area in northern Louisa County (Figure 3-1). Actual 2011 SO_2 emissions from LGS were 7,306 tons. This facility is included in the attainment demonstration modeling. No other sources outside the nonattainment area need further evaluation.

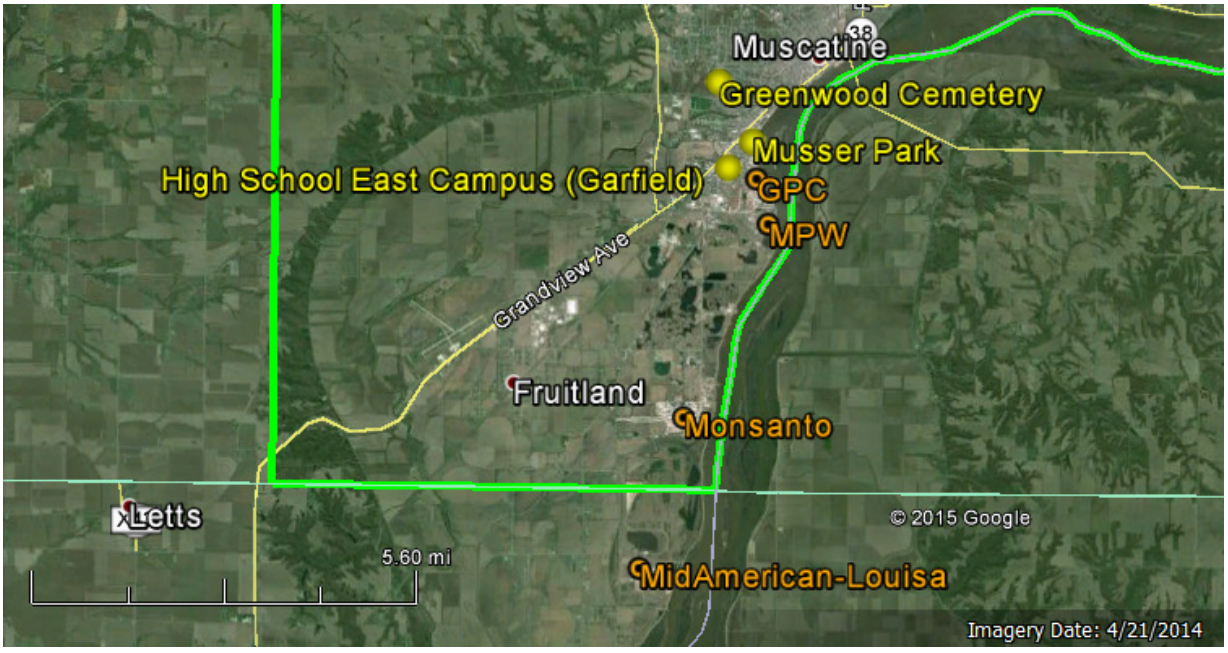


Figure 3-1. Location of MidAmerican's Louisa Generating Station (outside the nonattainment area).

Within the nonattainment area there are four facilities with non-zero SO_2 emissions that are appropriately excluded from the attainment demonstration: HNI Corporation - North Campus; H.J. Heinz, L.P.; Union Tank Car Co.; and HNI Corporation - Central Campus. Respectively, their 2011 SO_2 emission totals were 0.07, 0.05, 0.01, and 0.01 tons per year. These facilities do not need to be explicitly modeled because they emit very little SO_2 (0.14 tons per year, cumulatively in 2011) and are adequately characterized by background SO_2 concentrations.

Although SO_2 emissions in and near the nonattainment area are principally attributable to point sources, a comprehensive emissions inventory includes an assessment of the other source sectors. This is readily accomplished using detailed estimates of air emissions for the onroad, nonroad, and nonpoint (area) sources from EPA's 2011 National Emissions Inventory (NEI) datasets.

According to sector summary analyses completed by the Iowa DNR using EPA's SCC (source classification code) full detail data files from the 2011 NEI (version 2, dated March 4, 2015), approximately 2.64 tons of SO_2 are emitted by onroad mobile sources in all of Muscatine County (this includes areas within and outside of the nonattainment area). Nonroad mobile sources (which include non-road equipment, locomotives, commercial marine vessels, and aircraft) contribute approximately 1.99 tons of SO_2. Again, that estimate encompasses sources across all of Muscatine County. Nonpoint (area) SO_2 emissions are also low, at approximately 18.73 tons per year. Of that total, roughly half (8.92 tons) is associated with emissions from fires (mostly prescribed fires). As with the mobile sectors the nonpoint totals also represent sums across all of Muscatine County. Sub-county (nonattainment area only) totals are not readily available, however, they are not needed. All onroad, nonroad, and nonpoint sources in and near the Muscatine nonattainment area are adequately represented by background concentrations included in modeling analysis. No further consideration of these sectors is warranted.

4. Control Strategy (Including RACT/RACM)

Working with GPC, MPW, and Monsanto the DNR developed an implementable control strategy designed to ensure expeditious attainment of the 1-hr SO_2 NAAQS. The control strategy establishes source-specific control measures that include more stringent SO_2 emissions limits, new control devices, and process changes. Compliance measures with specific timetables for implementation establish minimum performance criteria and schedules for completing verification processes that satisfy CAA §172(c)(6) requirements. According to the dispersion modeling results used in development of the control strategy, the enforceable control measures ensure attainment of the 1-hr SO_2 NAAQS.

New air construction permits issued to GPC, MPW, and Monsanto are the enforceable mechanisms that require implementation of the control strategy and the associated Reasonably Available Control Technology and Reasonable Available Control Measures (RACT/RACM).[9] The construction permits include emissions limits, timetables for compliance, and enforcement criteria necessary to satisfy CAA §172(c)(6).

4.1. Grain Processing Corporation

To ensure the SO_2 NAAQS is attained GPC must install additional scrubbers, comply with new and more stringent SO_2 emission limits, and implement process modifications designed to reduce SO_2 emissions across numerous downstream sources. Table 4-1 (found in Section 4.4) lists the sources included in the control strategy, contains descriptions of the control measures, and provides effective dates. Source-specific permitted allowable emission rates, compliance and monitoring obligations, reporting and recordkeeping requirements, and implementation deadlines (where not immediately effectively upon permit issuance) are detailed in each construction permit included with this SIP submittal. While Appendix B contains the federally enforceable air construction permits that define GPC's requirements, several measures are summarized here:

- Effective December 10, 2015, Boilers 1-4 and 6-7 are subject to a more stringent SO_2 emission limit that reflects an existing requirement that restricts these boilers to firing on natural gas only.[10] (Switching fuel from coal to natural gas will reduce SO_2 emissions from these boilers by approximately 10,374 tons per year, in terms of 2011 actual emissions data.)
- New, more stringent, source-specific SO_2 limits have been established for existing sources.
- Instead of sulfur dioxide, sodium bisulfite is added to the steep water. This process adjustment reduces SO_2 emissions from the steeping operations and downstream processes. The control strategy requires GPC to continue implementing this process change.
- GPC is required to install scrubbers on EP015.0, EP097.0, EP126.0, EP200N, EP200S, and EP279.0. These six new scrubbers will reduce SO_2 emissions by up to 90% from these sources.

4.2. Muscatine Power & Water

Muscatine Power & Water is subject to several federal programs that directly or indirectly affect SO_2 emissions, including the Acid Rain provisions of Title IV of the CAA, the Cross State Air Pollution Rule

[9] The RACT/RACM requirements of Section 172(c)(1) are satisfied by implementing the level of control necessary to expeditiously attain the standards. See p. 14 of EPA's April 23, 2014, *Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions*.

[10] On July 14, 2015, GPC converted the coal-fired boilers to only natural gas combustion to comply with a requirement in the consent order, judgment, and decree entered into between the State of Iowa and Grain Processing Corporation [Law No. CVCV020979, Iowa District Court for Muscatine County (March 27, 2014)]. This fuel conversion is not specifically required by this SIP, however, the new RACT emission limit is based on combusting natural gas only.

(CSAPR), and the CAA Section 112 MACT regulations more commonly known as the Mercury and Air Toxics Standards (MATS). However, MPW's control measures do not rely on federal programs. Instead MPW will comply with new SO_2 emission limits that simultaneously provide for attainment of the NAAQS and a flexible operating schedule. The control measures account for seven possible operating scenarios involving the three coal-fired boilers (Units 7, 8, and 9). Although Appendix C contains the federally enforceable air construction permits that define the control strategy, the control strategy is briefly summarized here and in Table 4-2 (found in Section 4.4).

- A new more stringent SO_2 emission limit that works in conjunction with a compliance formula that provides operational flexibility while constraining SO_2 emissions across all three coal fired boilers (Units 7, 8, and 9) simultaneously.
- A more stringent SO_2 emission limit on the auxiliary boiler when it is firing fuel oil. (This unit is not capable of burning coal.)

Longer Term Emission Limits (21-day)

As discussed in EPA's April 23, 2014, *Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions*, past EPA guidance has recommended that averaging times in SIP emission limits not exceed the applicable NAAQS averaging time, in this case 1-hour. However, sources that have highly variable emission rates might require a 1-hour emission rate limit that is difficult to achieve in practice. To alleviate conservatism and account for source emissions variability EPA's April 23, 2014, guidance document provides for establishing longer term averaging limits based on a supportable downward adjustment of the critical emissions value. The critical emissions value is the 1-hr averaged emission rate that dispersion modeling predicts would attain the NAAQS.

The control strategy allows MPW to meet a compliance formula based on a 21-day averaging period. While averaging periods of up to 30-days are discussed in EPA guidance, compliance for MPW is based on a shorter, and thus more stringent, 21-day averaging period. The new compliance formula incorporates a weighting function derived from the modeling results and downward adjustments of the critical emissions values. A separate downward adjustment was calculated for each unit using five years of unit-specific CEMS data, 2010-2014; this data is considered representative of boiler operations. The 1-hour critical emissions values incorporate the adjustment to a longer term limit according to the ratio of the 99^{th} percentile 21-day average emission rate to the 99^{th} percentile 1-hr emission rates from the CEMS data.

4.3. Monsanto Company

The control measures developed for Monsanto establish lower emission limits on two sources, as described in Table 4-3 (found in Section 4.4) and highlighted below. Appendix D contains the federally enforceable air construction permits, which became enforceable on May 13, 2015.

- A more stringent SO_2 emission limit for the coal-fired boiler, Boiler #8.
- A new SO_2 emission limit for the CAC Process Flare Burner and a new provision restricting this source's fuel use to natural gas only.

4.4. Control Strategy Summary Tables

Table 4-1. Summary of the control measures for GPC.

Source Name	Emission Point ID	Permit Number	SO_2 Control Measure(s) Description	Emissions Limit Effective Date (on or before)*
Power House- Boilers No. 1, No. 2, No.3, No.4, No.6, No.7 (EU5201.0, EU5202.0, EU5203.0, EU5204.0, EU5206.0, EU5207.0)	EP001.0	95-A-374-S4	• Add a new, more stringent, SO_2 emission limit (based on natural gas combustion)	December 10, 2015
#1 Wet Germ Cyclone to the #1 North Top Rotary Germ Drier (EU 2801.0)	EP014.0	15-A-078	• Establish SO_2 emission limit	December 10, 2015
#1 North Top Rotary Germ Drier (EU 2802.0), #2 North Bottom Rotary Germ Drier (EU 2802.1)	EP015.0	79-A-194-S2	• Add Scrubber: By no later than August 30, 2017, the owner or operator shall install the Packed Bed Scrubber (CE2802-2) to control SO_2 emissions from Germ Driers #1 and #2 • Modify SO_2 emission limit to increase stringency	August 30, 2017
Gluten Day Bin (EU1213.0)	EP038.0	71-A-067-S4	• Establish SO_2 emission limit	December 10, 2015
#1 Gluten Flash Dryer (EU 1217.0), #1 Gluten Flash Dryer Direct Fired Burner (EU1217.1), #2 Gluten Flash Dryer (EU 1217.2), #2 Gluten Flash Dryer Direct Fired Burner (EU1217.3)	EP043.1	75-A-087-S1	• Establish SO_2 emission limit (the limit is based on pending scrubber improvements)	August 1, 2016
Maltrin #1 Spray Dryer (EU3101.0), Maltrin #1 Spray Dryer Direct-Fired Burner (EU3101.1)	EP066.0	72-A-199-S2	• Establish SO_2 emission limit	December 10, 2015
#2 Wet Germ Cyclone to #3 South Top Rotary Germ Drier (EU2803.0)	EP096.0	74-A-014-S1	• Establish SO_2 emission limit	December 10, 2015
#3 South Top Rotary Germ Drier (EU 2804.0)	EP097.0	74-A-015-S2	• Add Scrubber: By no later than August 30, 2017, the owner or operator shall install the Packed Bed Scrubber (CE2804-2) to control SO_2 emissions from Germ Drier #3 • Modify SO_2 emission limit to increase stringency	August 30, 2017

Source Name	Emission Point ID	Permit Number	SO_2 Control Measure(s) Description	Emissions Limit Effective Date (on or before)*
Dryer House Warehouse #1 Crown Feed Cooler (EU 1234.0)	EP119.0	75-A-353-S2	• Establish SO_2 emission limit	July 6, 2015
#4 South Bottom Rotary Germ Drier (EU2807.0)	EP126.0	79-A-195-S2	• Add Scrubber: By no later than August 30, 2017, the owner or operator shall install the Packed Bed Scrubber (CE2807-2) to control SO_2 emissions from Germ Drier #4 • Modify SO_2 emission limit to increase stringency	August 30, 2017
Maltrin #3 Spray Dryer (EU3111.0), Maltrin #3 Spray Dryer Direct-Fired Burner (EU3111.1)	EP132.1	80-A-149-S5	• Establish SO_2 emission limit	September 1, 2016
Maltrin #3 Spray Dryer (EU3111.0), Maltrin #3 Spray Dryer Direct-Fired Burner (EU3111.1)	EP132.2	80-A-150-S5	• Establish SO_2 emission limit	September 1, 2016
Maltrin #4 Spray Dryer, East Stack (EU3110.0), Maltrin #4 Spray Dryer Direct-Fired Burner (EU3110.1)	EP135.0	85-A-031-S2	• Establish SO_2 emission limit	December 10, 2015
Maltrin #4 Spray Dryer, West Stack (EU3110.0), Maltrin #4 Spray Dryer Direct-Fired Burner (EU3110.1)	EP136.0	85-A-032-S2	• Establish SO_2 emission limit	December 10, 2015
Boiler #10: Combustion Engineering Natural Gas Fired Boiler (EU5210.0)	EP142.0	85-A-038-P1	• Establish SO_2 emission limit	December 10, 2015
Boiler #11: Combustion Engineering Natural Gas Fired Boiler (EU5211.0)	EP153.0	85-A-135-P1	• Establish SO_2 emission limit	December 10, 2015
Dryer House Warehouse #2 Crown Feed Cooler (EU 1242.0)	EP167.0	90-A-111-S1	• Establish SO_2 emission limit	July 6, 2015
GP2 - #4 Gluten Pre-Mill Cooling System(EU1245.0) and Gluten Mill (EU1246.0)	EP174.0	91-A-068-S2	• Establish SO_2 emission limit	December 10, 2015

Source Name	Emission Point ID	Permit Number	SO_2 Control Measure(s) Description	Emissions Limit Effective Date (on or before)*
Power House- Boiler No.12 (EU5212.0)	EP177.0	93-A-110-P1	• Establish SO_2 emission limit	December 10, 2015
Gluten Surge Bin, Feed Loading Surge Bin, GP2 #1 Feed Truck Loadout (EU 1258.0)	EP179.0	92-A-383-S2	• Establish SO_2 emission limit	July 6, 2015
Gluten Surge Bin, Feed Loading Surge Bin, GP2 #2 Feed Truck Loadout (EU 1259.0)	EP180.0	92-A-385-S1	• Establish SO_2 emission limit	July 6, 2015
Maltrin #6 Spray Dryer (EU3116.0), Maltrin #6 Spray Dryer Direct-Fired Burner (EU3116.1)	EP186.0	94-A-055-S1	• Establish SO_2 emission limit	December 10, 2015
Maltrin #6 Spray Dryer (EU3116.0), Maltrin #6 Spray Dryer Direct-Fired Burner (EU3116.1)	EP187.0	94-A-061-S1	• Establish SO_2 emission limit	December 10, 2015
GP2 Gluten Loadout Pneumatic Transport System (EU 1256.0)	EP190A	02-A-781-S2	• Establish SO_2 emission limit	July 6, 2015
GP2 Gluten Truck Loadout Bin (EU 1257.0)	EP190B	02-A-782-S2	• Establish SO_2 emission limit	July 6, 2015
Dryer House 4, Spent Germ Receiving (EU1262.0)	EP195.0	09-A-482-S2	• Establish SO_2 emission limit	December 10, 2015
DH4 and DH5 Rotary Dryers Product Receiver Cyclone (EU1263.0)	EP196.0	10-A-563-S1	• Establish SO_2 emission limit	December 10, 2015
Corn Wet Mill Steep Tanks Nos. 1-24 (EU2810.0 – EU2833.0), Corn Wet Mill Steep Tanks Nos. 25-30 (EU2834.0 – EU2839.0), North Corn Wet Drag (EU2898.1)	EP200N	15-A-200	• Add Scrubber: The Spray Chamber Scrubber (CE2810-1) shall be installed by December 31, 2017, to control SO_2 emissions from Corn Steep Tanks 1-30 (EU2810.0 – EU2839.0) and the North Wet Corn Drag (EU2898.1) • Establish SO_2 emission limit	December 31, 2017
Corn Wet Mill Steep Tanks Nos. 31-42, 51-58 (EU2840.0 – EU2851.0, EU2860.0-EU2867.0), Corn Wet Mill Steep Tanks Nos. 43-50, 59-62 (EU2852.0 – EU2859.0, EU2868 – EU2871), South Wet Corn Drag (EU2898.2)	EP200S	15-A-201	• Add Scrubber: The Spray Chamber scrubber (CE2810-2) shall be installed by January 31, 2018, to control SO_2 emissions from Corn Steep Tanks 31-62 (EU2840.0 – EU2871.0), and the South Wet Corn Drag (EU2898.2) • Establish SO_2 emission limit	January 31, 2018
Corn Wet Mill Steep Water Tank (EU2896.0)	EP264.0	15-A-202	• Establish SO_2 emission limit	December 10, 2015

Source Name	Emission Point ID	Permit Number	SO_2 Control Measure(s) Description	Emissions Limit Effective Date (on or before)*
GP1: Gluten Filter No. 1 (EU1250.0)	EP268.0	15-A-203	• Establish SO_2 emission limit	February 15, 2016
GP1: Gluten Filter No. 2 (EU1251.0)	EP269.0	15-A-204	• Establish SO_2 emission limit	February 15, 2016
GP1: Gluten Filter No. 3 (EU1252.0)	EP270.0	15-A-205	• Establish SO_2 emission limit	February 15, 2016
GP1: Gluten Filter No. 4 (EU1253.0)	EP271.0	15-A-206	• Establish SO_2 emission limit	February 15, 2016
GP1: Gluten Filter No. 5 (EU1254.0)	EP272.0	15-A-207	• Establish SO_2 emission limit	February 15, 2016
Starch Building (EU2433.0)	EP278.0	15-A-208	• Establish SO_2 emission limit	December 10, 2015
Wet Mill Bins Nos. 1-6 (EU2895.1 – EU2895.6)	EP279.0	15-A-209	• Add Scrubber: The Spray Chamber Scrubber (CE2895-1) shall be installed by March 31, 2018, to control SO_2 emissions from Wet Milling 1-6 • Establish SO_2 emission limit	March 31, 2018
GP1: Gluten Filter No. 6 (EU1255.6)	EP283.0	15-A-480	• Establish SO_2 emission limit	February 15, 2016
GP1: Gluten Filter No. 7 (EU1255.7)	EP284.0	15-A-481	• Establish SO_2 emission limit	February 15, 2016
GP1: Gluten Filter No. 8 (EU1255.8)	EP285.0	15-A-482	• Establish SO_2 emission limit	February 15, 2016
GP1: Gluten Filter No. 9 (EU1255.9)	EP286.0	15-A-483	• Establish SO_2 emission limit	February 15, 2016
Dryer House 4, Rotary Dryer #5 (EU1236.0) Dryer House 4, Rotary Dryer #6 (EU1238.0) Dryer House 4, Rotary Dryer #7 (EU1241.0)	EP311.0	15-A-213	• Establish SO_2 emission limit	November 1, 2016
GP2: Gluten Filter No. 1 (EU1281.1), Gluten Filter No. 4 (EU1281.4),	EP312.0	15-A-484	• Establish SO_2 emission limit	February 15, 2016
GP2: Gluten Filter No. 2 (EU1281.2), Gluten Filter No. 3 (EU1281.3)	EP313.0	15-A-485	• Establish SO_2 emission limit	February 15, 2016
GP2: Gluten Filter No. 5 (EU1281.5), Gluten Filter No. 6 (EU1281.6), Gluten Filter No. 7 (EU1281.7),	EP314.0	15-A-486	• Establish SO_2 emission limit	February 15, 2016
#5 Wet Mill Germ Dryer (EU2874.0) #3 Germ Transfer and Receiver (EU2894.0)	EP315.0	15-A-326	• Establish SO_2 emission limit	March 31, 2018
Gluten Plant 1 Pneumatic Transport System (EU1260.0)	EP531.0	03-A-471-S1	• Establish SO_2 emission limit	July 6, 2015

Source Name	Emission Point ID	Permit Number	SO_2 Control Measure(s) Description	Emissions Limit Effective Date (on or before)*
Mash Fermenters Nos. 1-23 (EU6301.0 – EU6323.0), Mash Fermenters Nos. 24-29 (EU6324.0 – EU6329.0)	EP544.0	05-A-926-S4	• Establish SO_2 emission limit	February 15, 2016
Seventeen Expellers for Spent Germ Hulls (EU2876.0 – EU2893.0)	EP545.0	06-A-1261-S1	• Establish SO_2 emission limit	December 10, 2015
#1 Alpha Laval Centrifuge in Dryer House 4 (DH4) (EU1264.0)	EP546.0	11-A-338-S1	• Modify SO_2 emission limit to increase stringency	July 6, 2015
East Tank and C-400 Thrus Tank (EU1264.0, 1264.2)	EP551.0	15-A-354	• Establish SO_2 emission limit	December 10, 2015
Wet Feed Pad and Loadout for feed with 10% moisture content or greater (EU1276.0)	EP WETFEED	15-A-199	• Establish SO_2 emission limit	December 10, 2015
*If the emission unit is operational before the emission limit effective date, the date the unit becomes operational is the effective date of the SO_2 emission limit				

Table 4-2. Summary of the control measures for MPW.

Source Name	Emission Point ID	Permit Number	SO_2 Control Measure Description	Emissions Limit Effective Date
Auxiliary Boiler	EP60	13-A-152-S1	• Modify SO_2 emission limit to increase stringency	January 1, 2017
Unit 7 (U7)	EP70	74-A-175-S4	• Modify SO_2 emission limit to increase stringency	January 1, 2017
Unit 8 (U8)	EP80	95-A-373-P3	• Modify SO_2 emission limit to increase stringency	January 1, 2017
Unit 9 (U9)	EP90	80-A-191-P3	• Modify SO_2 emission limit to increase stringency	January 1, 2017

Table 4-3. Summary of the control measures for Monsanto.

Source Name	Emission Point ID	Permit Number	SO_2 Control Measure Description	Emissions Limit Effective Date
Boiler #8	EP-195	82-A-092-P11	• Modify SO_2 emission limit to increase stringency	May 13, 2015
CAC Process Flare Burner	EP-234	88-A-001-S3	• Add a new, more stringent, SO_2 emission limit (based on natural gas combustion)	May 13, 2015

5. Attainment Demonstration

To help ensure the control strategy is sufficient to attain the 1-hr SO_2 NAAQS, dispersion modeling results are used to simulate the impact of the control measures on air quality concentrations. Building an efficient control strategy begins by using dispersion modeling to evaluate the extent of predicted 1-hour SO_2 exceedances and to assess which facilities significantly contributed to those predicted exceedances.

The final control strategy is designed to ensure that the cumulative effect of all control measures produces modeled attainment of the 1-hr SO_2 NAAQS. This chapter summarizes the modeling analysis conducted for the attainment demonstration.

5.1. Model Selection and Options

Air Quality Model Selection: The dispersion model used for this analysis was the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD). The most current version of AERMOD available during each phase of the analysis was used. Preliminary analyses were not reevaluated with the newest version of AERMOD. The final control strategy analysis utilized version 15181.

All analyses were conducted with EPA's regulatory default options. The modeling analysis was conducted using the latest EPA guidance available for evaluating SO_2 impacts. This guidance includes the August 23, 2010, 1-hour SO_2 clarification memo[11]; the applicable portions of the March 1, 2011, 1-hour NO_2 clarification memo[12]; and the applicable portions of the December 2013 SO_2 Technical Assistance Document (TAD)[13].

Receptor Grid/Spacing/Terrain Elevations: The receptor grid was centered on the Musser Park monitor, and extended out to the edges of the nonattainment area. The grid utilized 50-meter receptor spacing along property boundaries and extending out to 0.5 kilometers from the Musser Park monitor, 100-meter spacing out to 1.5 kilometers, 250-meter spacing out to 3 kilometers, 500-meter spacing out to 5 kilometers, and 1000-meter spacing beyond 5 km. The receptor grid encompassed the entire nonattainment area.

Those portions of the fence lines of the facilities being evaluated that fall outside of the nonattainment area were omitted from the analysis. Finer grid spacing of 50 meters was used to resolve modeled impacts around other nearby individual facilities included in the analyses, but finer grid spacing was applied only around sources within the confines of the nonattainment area. Receptors were excluded from areas within the property boundaries of each facility in the analysis.

The most recent version of AERMAP (11103) was used to import terrain and source elevations from the National Elevation Dataset (NED).

---

[11] *Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard*, August 23, 2010.

[12] *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard*, March 1, 2011.

[13] *SO_2 NAAQS Designations Modeling Technical Assistance Document*, December 2013.

Downwash: All building downwash analyses were conducted using the most recent version (04274) of EPA's Building Profile Input Program with Plume Rise Enhancements (BPIP-Prime).

Meteorological Data: A detailed representivity analysis to support the use of Davenport meteorological data was previously approved by EPA for use in the $PM_{2.5}$ Muscatine SIP analysis. Modeling for the Muscatine 1-hr SO_2 nonattainment SIP was conducted using the surface station and upper air data from Davenport, and used consecutive years from 2008-2012. This represents the most recent, readily available 5-year period at the time of the initial analysis per section 8.3.1.2 of 40 CFR Part 51 Appendix W.

The most current version of AERMET available during each phase of the analysis was used. The data used in the preliminary analyses were not updated with the newest version of AERMET. The final control strategy analysis utilized data processed with AERMET version 14134.

5.2. Analysis

Source Inventory: A modeling analysis was conducted in support of the Technical Support Document (TSD) developed by the Department in April 2013 to evaluate proposed SO_2 nonattainment boundaries in Muscatine County. That analysis demonstrated that industrial sources along the Mississippi River have a role in causing or contributing to monitored exceedances at the Musser Park SO_2 monitor. Based on this analysis, all major sources of SO_2 emissions within the nonattainment area were included in the SIP analysis. These sources include GPC, MPW, and Monsanto.

The MidAmerican Energy – Louisa Generating Station (LGS) facility is located immediately south of the nonattainment area. This source was shown to be insignificant at the Musser Park monitor during predicted exceedances, but it is possible that it could cause a significant concentration gradient in the vicinity of the southern portion of the nonattainment area. For this reason, LGS was also included in the modeling analysis. There are two other major sources of SO_2 emissions in the vicinity of the Muscatine SO_2 nonattainment area, Gerdau Ameristeel (Gerdau) and SSAB, but they were both screened out of the analysis due to their low SO_2 emissions and distance from the nonattainment area.

The relative locations of the sources in the modeling inventory are shown in Figure 5-1. All emission units were modeled using their actual stack parameters and site layout. There were no stacks above formula GEP (good engineering practice) height. There are stacks greater than 65 meters at GPC, MPW, and Louisa. The tallest stack at Monsanto is 49 meters. Each stack that is taller than 65 meters is adjacent to tall buildings making the formula height taller than the actual stack height (Table 5-1). Therefore each of these stacks was modeled at their actual stack heights.

Intermittent Sources: Per EPA's March 1, 2011 clarification memo all emission units that operate intermittently were excluded from the analysis. Emergency engines and fire pumps that operate intermittently were excluded. Additionally, emission units that are limited to burning a specific fuel intermittently were modeled at emission rates that represent the fuel that is burned during normal operations. The two auxiliary boilers (EP2 and EP3) at Louisa are limited to burning fuel oil for no more than 48 hours per year. These two sources were modeled at emission rates associated with burning natural gas.

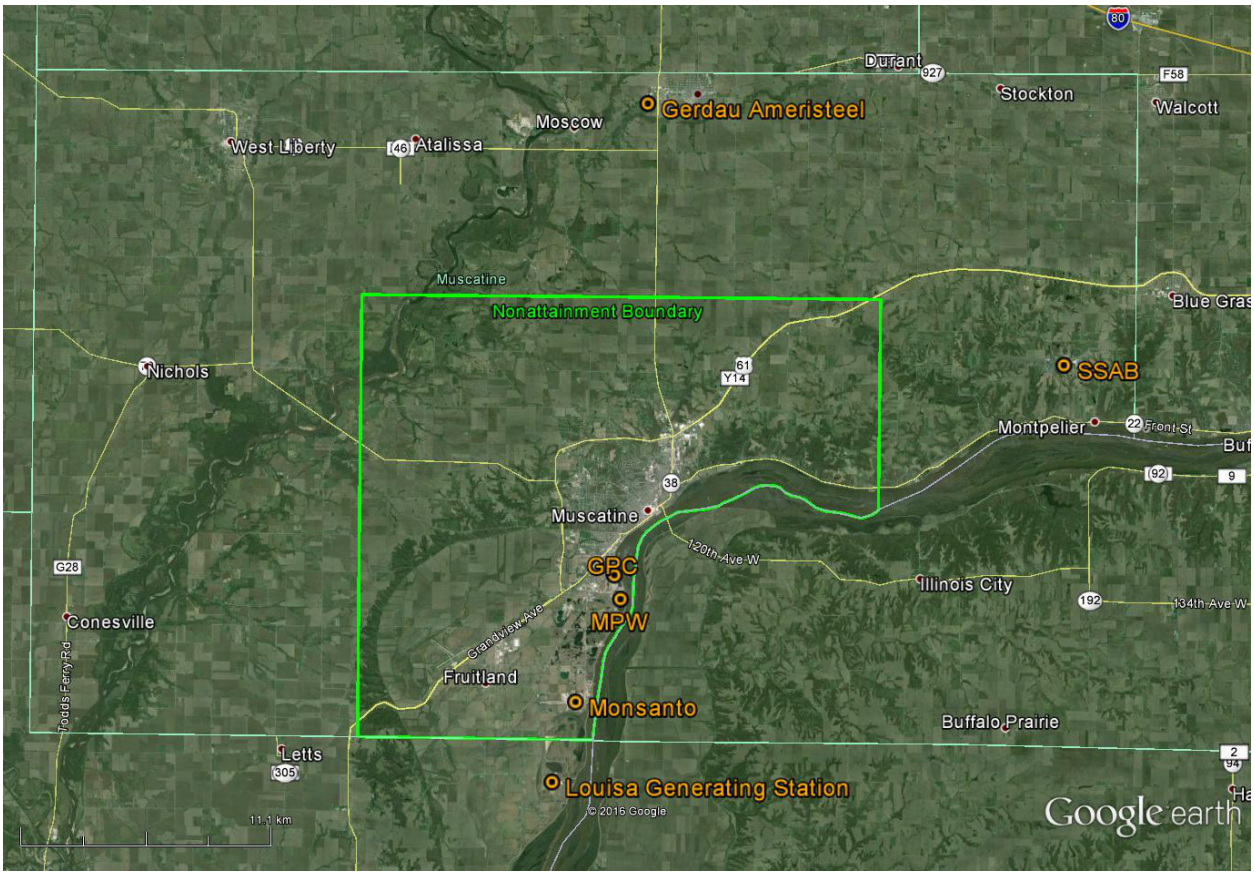


Figure 5-1. Major source SO_2 emitting facility locations in and near the nonattainment area.

Table 5-1. Tall stack GEP height determination.

Facility	Emission Point	Actual Height (meters)	GEP Formula Height (meters)
GPC	EP1.0	66.75	82.95
MPW	EP70	67.06	81.32
	EP80	68.58	81.32
	EP90	91.44	131.34
LGS	EP1	185.93	194.66

Background Value: Temporally varying background concentrations by hour and season from the Davenport SO_2 monitor were used to account for contributions to the predicted impacts from background SO_2 sources. The background values account for emissions from natural sources, major and minor point sources not included in the analysis, mobile (onroad and nonroad) sources, and nonpoint sources. The existing statewide SO_2 monitoring network was evaluated for an appropriate background (Table 5-2).

Table 5-2 Comparison of existing SO_2 monitoring sites outside Muscatine.

Monitor Location	2011-2013 Monitor Design Concentration (ppb)	2013 County-wide SO_2 Emissions* (tons/yr)	Proximity to SO_2 Sources
Cedar Rapids	23 (average of 2 sites)	6,419	Adjacent / 1+ km
Clinton	38	3,642	Adjacent
Davenport	15	4,771	1+ km
Des Moines	1	163	5+ km
Lake Sugema	3	~0	>10 km
Muscatine	217	20,086	Adjacent
Default (Tier 1)+	10.5	---	---

* Includes only major and minor point sources.

\+ Average of 2011-2013 design values for Cedar Rapids, Davenport, Des Moines, and Lake Sugema.

The ideal background represents the contributions from all sources not explicitly modeled. Louisa Generating Station was explicitly included in the modeling analysis, as were all major sources in Muscatine County, except for Gerdau and SSAB. Those two sources are approximately 8-9 km away from the nonattainment boundary. Combined they accounted for 254 of the 20,086 tons of SO_2 emitted in Muscatine County in 2013. The next closest major sources not included in the modeling analysis are Linwood and Lafarge, which are located in Scott County, approximately 20 km away from the nonattainment area. These two distant sources accounted for 1,539 of the 4,771 tons of SO_2 emitted in Scott County in 2013.

The Muscatine monitors are impacted heavily by sources that are being explicitly included in the modeling analysis. As such those monitors were eliminated as an option to represent the background concentrations in the area. Of the remaining monitor locations, two are situated adjacent to industrialized areas (Cedar Rapids and Clinton), and could overestimate the concentrations caused by distant major sources. The Des Moines and Lake Sugema monitors are impacted by less SO_2 emissions than need to be represented by the background for the nonattainment area. Therefore, the Davenport monitor was evaluated to determine if it would be a representative site.

The Davenport monitor is the nearest location other than those in Muscatine. The Davenport monitor is near a moderately industrialized area, but is not situated adjacent to those sources of emissions. It is approximately 1 km from the nearest industry and 11 km from Linwood and Lafarge. It is in a county with a moderate amount of SO_2 emissions. For these reasons it could account for the sources screened out of the control strategy, major sources in Scott County that may impact the Muscatine area (such as Lafarge and Linwood), and all other sources that could impact the Muscatine area. In addition, using the Davenport monitor is consistent with the meteorological data used for the analysis.

To account for seasonal and diurnal variations in the background levels, the background concentration was based on the average diurnal and seasonal concentration pattern observed at the Davenport monitor during the years 2011-2013. As referenced in Appendix A of the Guidance for 1-hour SO_2 Nonattainment Area SIP Submissions, "an appropriate methodology for calculating temporally varying background monitored concentrations by hour and season" is outlined in the SO_2 NAAQS Designations Modeling TAD and in the March 2011 EPA guidance for 1-hour NO_2 Modeling.

For the years 2011 through 2013, the 99th percentile monitor concentration was calculated for each season and hour of day and averages of these values across the three years (Figure 5-2).

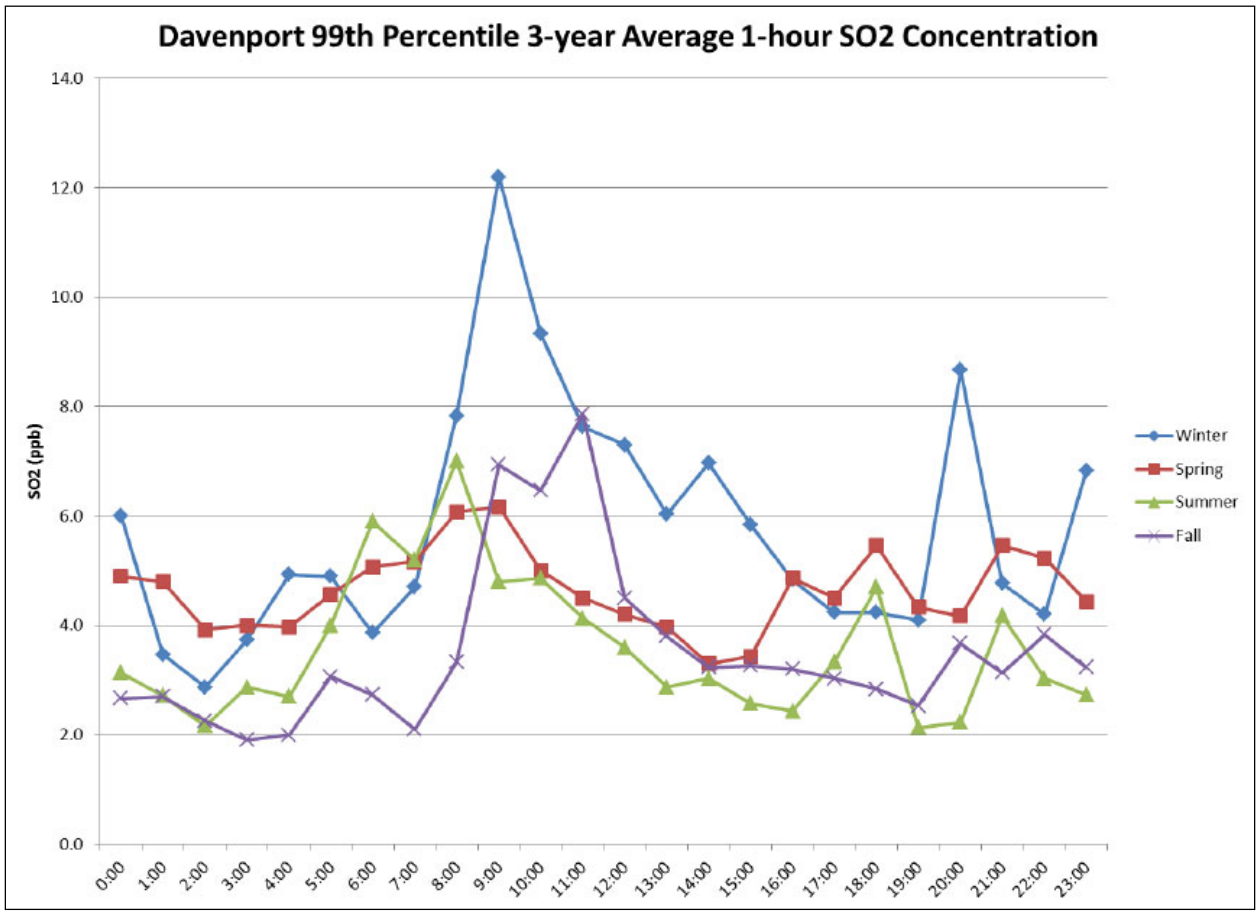


Figure 5-2. Davenport monitor concentrations by season and hour of day.

Only one hour in the winter approaches the overall 99th percentile design value for the Davenport monitor and the default (Tier 1) background value of 10.5 ppb is higher than all but one of the seasonal/diurnal concentrations. This shows that the use of the default (Tier 1) value for all hours and seasons would have been very conservative. The method of using temporally varying background monitor concentrations by hour and season from the Davenport monitor is still conservative as it is calculated from the 99th percentile versus an unbiased estimate from average values, which would yield a much lower background value.

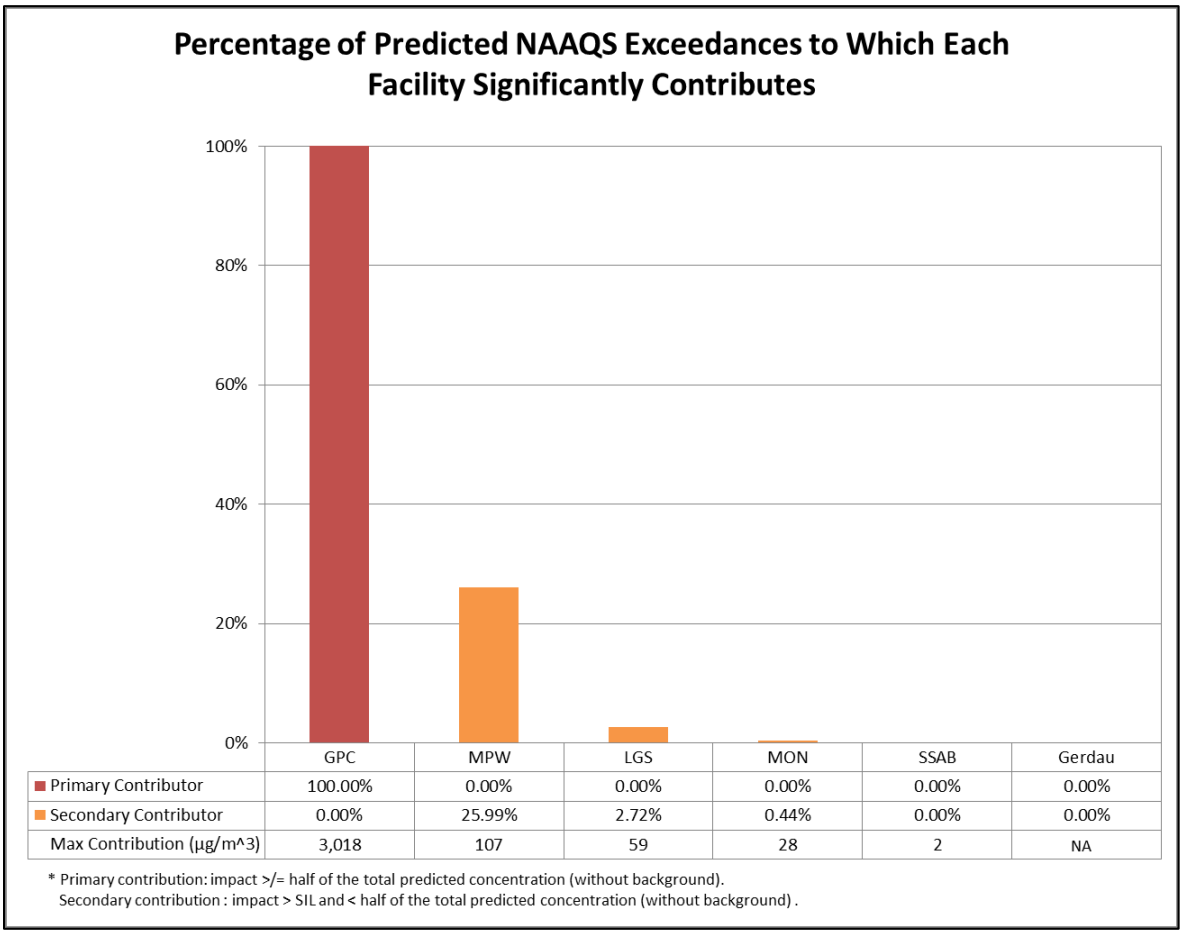
5.3. Results

The modeling analysis was conducted in multiple iterations as part of two distinct phases. The first phase of the analysis was a screening analysis to determine the sources that needed to be included in the analysis. The second phase of the analysis was used to develop the control strategy and included all significant sources identified for inclusion in the analysis from Phase 1.

Phase 1 – Preliminary Analysis: This phase was accomplished by modeling actual emissions from each facility and then determining the percentage of predicted NAAQS exceedances to which each facility significantly contributed. This information was further subdivided by classifying the significant contributions as either primary or secondary contributors. If the facility's significant contribution to the predicted NAAQS exceedance was greater than or equal to half of the total concentration (minus

background) it was considered the primary contributor. If the facility's contribution was less than half of the total concentration, but still more than the Significant Impact Level (SIL) it was considered a secondary contributor.

Each iteration of this phase implemented new information received from the facilities during the course of the analysis. The last of the iterations of Phase 1 represented the best picture of predicted concentrations caused by actual emissions from each facility. The results of this analysis are summarized in Figure 5-3.



	GPC	MPW	LGS	MON	SSAB	Gerdau
Primary Contributor	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Secondary Contributor	0.00%	25.99%	2.72%	0.44%	0.00%	0.00%
Max Contribution (µg/m^3)	3,018	107	59	28	2	NA

* Primary contribution: impact >/= half of the total predicted concentration (without background).
Secondary contribution : impact > SIL and < half of the total predicted concentration (without background) .

Figure 5-3. Results from the phase 1 culpability analysis.

GPC was identified as the primary contributor to all predicted NAAQS exceedances within the nonattainment area. MPW, Louisa, and Monsanto also all had significant contributions at multiple predicted exceedances. Both SSAB and Gerdau were evaluated at their allowable emission rates, and were insignificant at each predicted NAAQS exceedance. As such, these two sources were not included in the second phase of the analysis.

Phase 2 – Control Strategy Development: Sources identified in Phase 1 (GPC, MPW, Monsanto, and LGS) were modeled at their maximum permitted allowable emission rates. Using the process summarized below, more restrictive maximum permitted emission rates were developed where necessary to ensure modeled attainment.

GPC was provided with a model input file that included its emission units as well as the exceedance receptors to which it contributed. GPC reviewed the input data for accuracy and then mitigated all modeled exceedances caused by their facility alone. Since GPC was the primary contributor at every predicted exceedance, subsequent iterations of this phase were completed after GPC's initial control strategy was submitted.

The remaining facilities (MPW, Monsanto, and LGS) were then added to the analysis with their maximum permitted allowable emission rates and the cumulative impacts were determined across the entire nonattainment area. Any remaining predicted exceedances were then discussed with the affected facilities (Monsanto and MPW) and additional control measures were developed.

Monsanto proposed to decrease the emission rate for Boiler 8 at their facility to mitigate a small number of exceedances just north of their property.

MPW proposed multiple operational scenarios for their three main boilers (Units 7, 8, and 9). The model results varied depending on which combination of boilers was running. The modeling results for each scenario (with background included) are summarized in Table 5-3.

No changes to LGS's maximum allowable permitted emission rates were needed to mitigate any exceedances.

Table 5-3. Cumulative modeled ambient air impacts for each of MPW's seven operating scenarios.

MPW Scenario	Cumulative Model Result ($\mu g/m^3$)	1-hour SO_2 NAAQS ($\mu g/m^3$)
All	182.76	196
U9 Off	182.71	
U8 Off	183.66	
U7 Off	182.88	
U7 Only	183.96	
U8 Only	181.86	
U9 Only	187.78	

These results indicate that each operational scenario at MPW combined with the mitigation strategies for GPC and Monsanto, the current maximum allowable permitted emission rates from LGS, and background concentrations will result in attainment of the 1-hour SO_2 NAAQS.

6. Attainment Date and Reasonable Further Progress

Attainment Date

The effective date for the Muscatine 1-hr SO_2 nonattainment designation was October 4, 2013 (78 FR 47191, August 5, 2013). Section 192(a) of the CAA requires that the area achieve the 1-hr SO_2 NAAQS as expeditiously as practicable and no later than 5 years from the nonattainment designation. Sulfur dioxide nonattainment areas are not eligible for extensions of the attainment date.[14]

Compliance timelines in the air construction permits included with this SIP satisfy the requirement that the control measures and associated SO_2 emissions reductions be implemented as expeditiously as practicable. The DNR is identifying October 4, 2018, as the attainment date.

Reasonable Further Progress

Section 172(c)(2) of the CAA requires that nonattainment plans include provisions addressing reasonable further progress (RFP). Reasonable further progress is defined in CAA §171(1) as:

"*…such annual incremental reductions in emissions of the relevant air pollutant as are required by this part* [part D] *or may reasonably be required by the Administrator for the purpose of ensuring attainment of the applicable national ambient air quality standard by the applicable dat*e."

As discussed in EPA's SO_2 nonattainment guidance, this definition is most appropriate for pollutants that are emitted by numerous and diverse sources, where the relationship between any individual source and overall air quality is not explicitly quantified, and where NAAQS attainment requires inventory-wide emissions reductions. [15] Sulfur dioxide presents special circumstances because there are usually a limited number of well-defined sources affecting the area's air quality and any emission control measures commonly result in swift improvements that typically occur in one step. EPA therefore interprets that RFP is best construed as "adherence to an ambitious compliance schedule" (see 74 FR 13547, April 16, 1992).

The new SO_2 emission limits established for Monsanto became effective on May 13, 2015. Muscatine Power & Water must comply with their new emission limits and associated compliance requirements effective January 1, 2017. The new emission limits established for GPC occur on the timelines as summarized in Table 4-1.

The control strategy requires the installation of six new scrubbers at GPC that will reduce SO_2 emissions by up to 90% from the affected sources. While the scrubber installations will not be completed by January 1, 2017, a desired target date discussed in EPA's April 23, 2014, *Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions* document, the scrubbers will be operational as expeditiously as practicable.

Based on permitted requirements, three of the six new scrubbers must be in operation no later than August 30, 2017, with the final scrubber operational by March 31, 2018. The installation timetable

[14] A 5-year maximum attainment timeline is specified in CAA §192 and therefore the use of attainment date extension provisions provided in §172(a)(C) are prohibited by §172(a)(D).
[15] See p. 40 of EPA's April 23, 2014, *Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions*.

accommodates factors such as demolition and construction schedules, structural modifications, ductwork design, and the addition of scrubber water treatment capacity.

The scrubber installation timeline will not delay or prevent timely attainment of the 1-hr SO_2 NAAQS. On July 14, 2015, GPC converted all their coal-fired boilers to natural gas. In terms of 2011 data, this fuel switch abruptly eliminated 10,374 tons of SO_2 emissions (representing ~96% of the facility total). The fuel conversion from coal to natural gas in GPC's boilers has significantly reduced measured ambient SO_2 concentrations in Muscatine. Based on existing air quality improvements the DNR projects that monitored attainment will be achieved by the attainment date.

Cumulatively, RFP requirements are satisfied by the expeditious implementation of the control strategy.

7. Nonattainment New Source Review and Emissions Quantification

Nonattainment New Source Review

Section 172(c)(5) of the CAA requires a special permitting process, known as nonattainment new source review (NNSR), for new or modified major sources located within a nonattainment area. The statutory requirements for NNSR permits are contained in Section 173 of the CAA and EPA defines the minimum criteria that a SIP approved NNSR program must meet in 40 CFR 51.165

On May 15, 2014 (79 FR 27763) EPA approved into Iowa's SIP the NNSR regulations in 567 Iowa Administrative Code (IAC) Chapter 31. The modified administrative rules in Chapter 31 became effective on January 15, 2015, as published on December 11, 2013, in the Iowa Administrative Bulletin Volume XXXVI Number 12, pages 1455-1456.

Identification & Quantification of Emissions

The SIP must identify and quantify the emissions which will be allowed from the construction and operation of major new or modified stationary sources in the area (see CAA §172(c)(4)). The state must demonstrate that such emissions will be consistent with RFP requirements and will not interfere with attainment of the 1-hr SO_2 NAAQS. These requirements are met by Iowa's preconstruction permitting program and implementation of the NNSR rules in 567 IAC 31.1, 31.3 – 31.10.

According to EPA's SO_2 nonattainment guidance the SIP should also include a projected attainment year inventory that includes estimated emissions for all emission sources of SO_2 that are determined to have an impact on the affected nonattainment area for the year in which the area is expected to attain the standard, consistent with the attainment demonstration.[16] This inventory should reflect projected emissions for the attainment year for all SO_2 sources in the nonattainment area. Table 7-1 provides a projected inventory conservatively prepared assuming each SO_2 source operates 8,760 hours per year at their permitted maximum allowable emission rate.[17] For simplification purposes the projections do not consider operational, physical, supply/demand, or other factors that typically curb actual emissions to values well below the maximum permitted allowable. Actual attainment-year emissions will therefore be lower, perhaps by a considerable margin, than those listed in Table 7-1.

Table 7-1. Projected annual SO_2 emissions (rounded to the nearest ton per year) conservatively estimated assuming continuous operation at maximum permitted allowable emission rates.

Facility	Post-Control Maximum Potential SO_2 Emissions (tpy)
GPC	167
MPW	5,051
Monsanto	1,196
TOTAL	**6,414**

[16] See p. 8 of EPA's April 23, 2014, *Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions*.

[17] The projections incorporate the enforceable emissions reductions required through the control strategy.

8. Contingency Measures

To comply with CAA §172(c)(9) the DNR developed contingency measures that will be implemented if either the attainment or RFP requirements are not met. While contingency measures for other criteria pollutants typically include additional control measures not included in the control strategy, SO_2 presents special considerations as explained in EPA's nonattainment guidance document.[18] For SO_2, contingency measures can mean that the state has a comprehensive program to identify sources of NAAQS violations and to undertake an aggressive follow-up for compliance and enforcement, including expedited procedures for establishing consent agreements pending adoption of a revised SIP. The DNR has developed contingency measures consistent with this guidance.

The DNR has a comprehensive program to identify sources of violations and to undertake aggressive follow-up for compliance and enforcement. DNR field inspectors have authority to conduct onsite inspections to review the compliance status of the facility (Iowa Code 455B.103(4)). Recordkeeping, reporting, and monitoring requirements established in construction permits provide the DNR with a mechanism to ensure continued compliance on a source-specific basis. Persons responsible for equipment are required to provide to the DNR information necessary to characterize emissions at the facility (567 IAC 21.1(3)). Facilities in the Title V operating permit program, which includes GPC, MPW, and Monsanto, are required to identify instances of deviations from permit requirements in semi-annual reports to the DNR, including deviations attributable to upset conditions, the cause of the deviations, and any corrective actions or preventive measures taken (567 IAC 22.108(5)). In addition, facilities are required to report and take corrective action in response to incidences of excess emissions (567 IAC 24).

Contingency measures will be triggered if ambient data measured after full implementation of the control strategy produces a 1-hr SO_2 NAAQS violation in the area, or if the area fails to meet RFP. If triggered, the DNR will evaluate culpabilities for the violation and will plan to complete the investigation within 3 months of the trigger. Where the investigation concludes unequivocally that SO_2 emissions from one of the three affected facilities in the nonattainment area resulted in the triggering of the contingency measures, the DNR will expeditiously conduct a compliance evaluation and establish orders (Iowa Code 455B.134) consistent with rules to cause the abatement or control of air pollution or make changes to the GPC, MPW, or Monsanto construction permits necessary to mitigate the NAAQS violations or failure to achieve RFP. Orders or construction permits will be issued within approximately 9 months of completion of the investigation and could include fuel switches, addition of controls, curtailment of production, reducing boiler operating loads, or other appropriate measures necessary to mitigate the violation.

Contingency measures will be implemented until the control strategy can be reviewed and updated as necessary to prevent future violations of the NAAQS. The DNR has statutory (Iowa Code 455B.133 et. seq.) and administrative rule provisions in place that will support the implementation of contingency measures in an expeditious fashion. The construction of new or modified sources that may impact the maintenance of attainment is regulated by 567 IAC 22.3(1)"b," which requires that the expected emissions from the proposed source, in conjunction with all other emissions, will not prevent the attainment or maintenance of the ambient air quality standards. DNR has the authority to modify a condition of approval or an existing permit for a major stationary source or an emission limit contained in an existing permit for a major stationary source if necessary to attain or maintain the NAAQS (567 IAC 22.3(5)).

[18] See p. 41 of EPA's April 23, 2014, *Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions*.

9. Additional SIP Material

9.1. Clean Air Act §110(a)(2) Requirements

Section 172(c)(7) of the CAA requires nonattainment SIPs to meet the applicable provisions of CAA §110(a)(2). While the provisions of 110(a)(2) address various topics, EPA's past determinations[19] suggest that only the §110(a)(2) criteria which are linked with a particular area's designation and classification are relevant to §172(c)(7). This nonattainment SIP submittal satisfies all applicable CAA §110(a)(2) criteria, as evidenced by the state's nonattainment new source review program which addresses 110(a)(2)(I), the included control strategy, and the associated emissions limits which are relevant to 110(a)(2)(A). In addition, on July 26, 2013, the DNR submitted to EPA an infrastructure SIP to demonstrate that the DNR has the necessary plans, programs, and statutory authority to implement the requirements of Section 110 of the CAA as they pertain to the 2010 1-hr SO_2 NAAQS.

9.2. Equivalent Techniques

The DNR followed existing regulations, guidance, and standard practices when conducting dispersion modeling, preparing emissions inventories, and implementing planning procedures. The DNR did not use or request approval of alternative or equivalent techniques as allowed under §172(c)(8) of the CAA.

9.3. Administrative Materials

State Implementation Plans addressing nonattainment areas must comply with general planning provisions in addition to the special provisions in §172 of the CAA. For example, Subpart F of 40 CFR 51 identifies procedural requirements and Appendix V of 40 CFR 51 establishes minimum criteria that must be met before a SIP revision can be considered an official submittal. This SIP submittal satisfies all the procedural requirements and addresses all the administrative criteria. Specifically, the materials discussed below address Section 2.1 of Appendix V of 40 CFR 51.

Submittal Letter

A formal letter of submittal from the designee of the Governor of the State of Iowa, requesting EPA approval of the proposed revision to the SIP for the State of Iowa, is included with the SIP submittal.

Evidence of State Adoption

The Iowa Environmental Protection Commission (EPC) approved on May 17, 2016, this plan for submittal to EPA as a revision of the SIP to address 1-hr SO_2 nonattainment in Muscatine County, Iowa. The DNR followed all applicable procedural requirements of the state's laws and constitution in obtaining the adoption of this plan.

Necessary Legal Authority

The DNR is the regulatory agency with primary responsibility for outdoor air quality permitting and compliance activities in the state of Iowa. The DNR's authority is set forth in chapter 455B of the Code of Iowa and implemented through 567 IAC Chapters 10 and 20-35, and 561 IAC Chapters 2 and 7. The DNR's permitting and compliance programs and associated rules have previously been approved by EPA as part of the State of Iowa's SIP.

[19] As one example, see a proposal discussing this issue in 76 FR 79579 (December 22, 2011, specifically pages 79583-79584) and the promulgation of those associated positions in the final rule 77 FR 34189 (June 12, 2012).

The State of Iowa has the necessary legal authority under state statute to adopt and implement this plan. Iowa Code section 455B.133(3) provides that the Iowa Environmental Protection Commission shall "adopt, amend, implement, or repeal emission limitations or standards for the atmosphere of this state on the basis of providing air quality necessary to protect the public health and welfare." The federal NAAQS for SO_2 are adopted by reference at 567 IAC 28. Iowa Code section 455B.134(9) states that the duties of the director include "issu[ing] orders consistent with rules to cause the abatement or control of air pollution, or to secure compliance with permit conditions."

In combination with the DNR's existing legal authority and associated administrative regulations, the control measures and other components included in this SIP revision are adequate to provide for the timely attainment and maintenance of the 2010 1-hr SO_2 NAAQS.

10. Public Notice and Response to Comments

The DNR's public participation process uses procedures that meet the requirements in 40 CFR 51.102 and Appendix V.

10.1.Evidence of Public Notice & Public Hearing Certification

Notice of the DNR's intention to revise the State Implementation Plan for the Muscatine 1-hr SO_2 nonattainment area and notice of the public comment period and public hearing was published on Thursday, February 25, 2016, in the *Muscatine Journal*. A copy of the notice and proof of publication is included in Appendix E. The *Muscatine Journal* also posted the notice to their website. The DNR distributed list serve articles discussing the draft SIP, public comment period, and public hearing on Thursday, February 25, 2016, to over 600 Iowa air quality list serve subscribers, and to media outlets and other EcoNewsWire subscribers.

An electronic copy of the nonattainment SIP document was posted on the DNR's Public Input Webpage at http://www.iowadnr.gov/airstakeholder. A copy of the nonattainment SIP was made available to the public at the Musser Public Library, 304 Iowa Ave, Muscatine, IA 52761. The comment period started on Thursday, February 25, 2016, and was originally scheduled to end on Thursday, March 31, 2016. In accordance with the information published in the public notice, a public hearing was conducted on Wednesday, March 30, 2016 at 3:00 p.m. at the Muscatine County Conservation Board's Environmental Learning Center, 3300 Cedar Street, Muscatine, IA 52761.

Before the close of the comment period the DNR received a request to extend the comment period by three weeks. The DNR granted this request and notice of the extension was published in the *Muscatine Journal* on April 5, 2016. A copy of the notice and proof of publication is included in Appendix E. In total the comment period lasted 57 days, starting Thursday, February 25, 2016, and ending Thursday, April 21, 2016.

10.2. Compilation of Public Comments and the State's Responses

During the public hearing the DNR received no oral comments. Four written comment letters were submitted to the DNR during the public comment period. Copies of all comments received are available from the DNR upon request. A summary of the comments and the DNR's responses are provided in the responsiveness summary below.

Comment

Two commenters support the SIP for the Muscatine 1-hour SO_2 nonattainment area. Issues noted by one or both commenters include historic air quality issues, the harms posed by high SO_2 emissions and concentrations, and associated negative impacts on economic progress. One commenter encourages the DNR to aggressively monitor for compliance through on-site inspections and reviewing compliance records. Similarly, the second commenter is concerned that the control strategy and its RACT/RACM requirements will not be vigorously enforced and Muscatine will be left again with a substandard environment.

Department Response

The DNR appreciates support for the revision to the State Implementation Plan and understands the importance of both healthy air and compliance with regulatory requirements. Therefore the control measures were developed to attain the NAAQS as quickly as possible and each control measure includes specific compliance requirements. The control measures are enforceable through air construction

permits and each permit includes mandatory notification, reporting, and recordkeeping requirements. The facilities must, for example, notify the DNR when they initiate construction and when they complete construction.

Each permit also contains performance testing (emissions testing) obligations with specific schedules, methods, and frequencies for compliance. Performance tests are a common method of oversight used by the DNR to evaluate compliance with permitted emission limits. Each performance test must be approved by the DNR and a testing protocol must be submitted to the DNR in advance of the compliance demonstration. Results of the tests must be submitted in writing to the DNR in the form of a comprehensive report within six weeks of the completion of any testing.

Additionally, GPC, MPW, and Monsanto are major sources under the Title V operating permit program and must submit semi-annual monitoring reports by September 30 and March 31, and an annual compliance certification by March 31, of each year. The DNR also inspects Title V sources at a minimum of every two years. In summary, the DNR has a comprehensive program to identify sources of violations and to undertake aggressive follow-up for compliance and enforcement.

Comment

Several comments are related and pertain to an assertion that Louisa Generation Station (LGS) was excluded from the modeled attainment demonstration and therefore significant changes are needed to the SIP. These comments are consolidated and summarized here:

- The draft SIP fails to demonstrate how the Muscatine nonattainment area will achieve attainment because it does not model or provide control measures for a major source [LGS] that the Iowa DNR has determined is contributing to violations of the standard. Iowa DNR must adequately characterize emission from LGS and revise the control strategy and attainment demonstration to meet federal requirements.
- The modeled attainment demonstration should be revised so that emissions from LGS are explicitly modeled, in accordance with EPA guidance and Appendix W to 40 CFR 51.
- The attainment demonstration and analyses included in the draft SIP do not support DNR's determination that sufficient reductions will occur in the affected area in order for the area to attain the 2010 SO_2 NAAQS as expeditiously as practicable. The analyses and control strategy must be revised to properly characterize and control emissions from LGS.
- LGS was not explicitly modeled and its emissions have not been characterized by either source-specific monitoring or refined dispersion modeling. The attainment demonstration does not demonstrate that all major sources of SO_2 emissions are being sufficiently controlled to ensure attainment throughout the nonattainment area. The inadequately modeled attainment demonstration is not a reliable basis for future redesignation once all the proposed control measures have been implemented.

Department Response

The Iowa DNR explicitly modeled emissions from LGS in the attainment demonstration modeling (and all earlier modeling phases). The attainment demonstration (control strategy) modeling uses methods that are fully compliant with all Appendix W criteria, consistent with EPA guidance, and in accordance with the modeling protocol developed for the nonattainment area and approved by EPA.

In the modeled attainment demonstration the DNR included, among other sources at the LGS, the main boiler stack. The DNR followed EPA's April 23, 2014, *Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions*, to convert LGS's 30-day rolling average maximum allowable permitted emission rate of

3449.6 lb/hr to a higher 1-hour critical value of 4,271 lb/hr used for modeling purposes. It is worth noting that LGS's maximum contribution to predicted exceedances, as presented in Figure 5-3, is provided in units of $\mu g/m^3$ and is not an exceedance count. This clarification is provided to address any uncertainty that may exist regarding the meaning of the data in Figure 5-3.

The attainment demonstration supports the effectiveness of the control strategy throughout the nonattainment area and provides for attainment without additional restrictions on LGS. Since emissions from LGS are adequately characterized in the modeled attainment demonstration no SIP revisions are needed, except that the DNR has edited and added text in Chapter 5 to further clarify that LGS was included in the attainment demonstration.

Comment

The commenter states that LGS will be the largest single source of SO_2 in the region at the time the SIP is implemented. The commenter believes the southern portion of the nonattainment area is likely to have the highest SO_2 concentrations, based on the presence of LGS and Monsanto. Therefore Iowa DNR should determine whether the Musser Park monitor will be located in the area of maximum concentration at the time the SIP is implemented.

Department Response

It is not necessary to evaluate if the Musser Park monitor will be located in the area of maximum impact after the SIP is implemented. The modeled attainment demonstration accounts for SO_2 emissions from LGS and shows attainment throughout the area. Additionally, retaining the existing monitors at their current locations is valuable because spatial continuity is needed to evaluate the effectiveness of the control strategy and is critical to the redesignations process. Relocating the SO_2 monitors in the area would be counterproductive and could prevent the timely redesignation of the area to attainment.

Comment

The EPA Regional Administrator should exercise its discretionary authority and, if necessary, require an additional monitor in the southern portion of the nonattainment area.

Department Response

The DNR cannot speak to discretionary authorities granted to the EPA Regional Administrator. From a technical perspective, siting an additional SO_2 monitor in the southern portion of the nonattainment area is unnecessary based upon the results of the attainment demonstration.[20]

Comment

The commenter believes there may be inconsistency of the inclusion of certain permits into Iowa's SIP. The Iowa DNR must assure that the plan is consistent with Section 172(c) of the CAA. Before a plan can be considered completed and included into the SIP, the plan must be quantifiable, permanent and include enforceable provisions, as required by CAA 172(c)(6). The commenter also cites the following language from EPA's April 23, 2014 *Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions*:

[20] This conclusion is also supported by preliminary modeling analyses of LGS being conducted for EPA's 1-hr SO_2 Data Requirements Rule (DRR). Documentation of those results, when final, will be submitted to EPA pursuant to the DRR and its timelines.

C. Attainment Demonstration

Section 172(c) of the CAA directs states with nonattainment areas to submit an attainment demonstration as a part of the NAA SIP. An approvable attainment demonstration would be an air quality modeling analysis that demonstrates that the emission limits in the plan will suffice to provide for timely attainment of the affected standard. In cases where the necessary emission limits have not previously been made a part of the SIP, or have not otherwise become federally enforceable, the plan needs to include the necessary enforceable limits in adopted form suitable for incorporation into the SIP in order for it to be approved by the EPA.

Department Response

The DNR agrees that this SIP revision must contain quantifiable, permanent, and enforceable provisions necessary for compliance with the 1-hr SO_2 NAAQS. To ensure these and all other applicable requirements of CAA Sec 172(c) are met, the DNR has included in this SIP every air construction permit that establishes new emission limits necessary for attainment of the 1-hour SO_2 NAAQS in the Muscatine nonattainment area. Every emission limit is quantifiable, enforceable, and permanent.

This SIP revision submittal appropriately excludes construction permits that were already in place under the existing SIP (pursuant to the authority established in 40 CFR 52 Subpart Q), that placed federally enforceable limits on SO_2 emissions. There are a small number of such permits that had existing enforceable SO_2 emission limits. While those sources were included in the modeling analysis, no changes to their SO_2 limits were necessary for attainment of the 1-hr SO_2 NAAQS.

The absence of those permits from the SIP revision will in no way alter the DNR's response to any source modifications that may be proposed in the future. Iowa Administrative Code 567-22.3(1)"b" prevents the department from issuing a construction permit if "…the expected emissions from the proposed source or modification in conjunction with all other emissions will not prevent the attainment or maintenance of the ambient air quality standards…" This rule requires the DNR to evaluate any future proposed modifications that may negatively affect ambient SO_2 concentrations in the area. To satisfy the requirements of that rule the DNR will continue to conduct comprehensive dispersion modeling of SO_2 sources in or near the nonattainment area.

The DNR believes this SIP is consistent with EPA's guidance and includes all the necessary permits to satisfy the Clean Air Act.

Appendix A. Ambient Monitoring Data (2011-2014)

An exceedance of the 75 ppb 1-hr SO_2 standard can be defined as any day with a maximum 1-hr concentration greater than or equal to 75.5 ppb. Because design values are calculated using the 99th percentile of 1-hour daily maximum concentrations (averaged over 3 years) the number of exceedances (the exceedance count) is not directly part of the 1-hr SO_2 NAAQS evaluation. However, there is often interest in exceedance counts and exceedance frequency. Figure A-1 provides exceedance counts for each monitor by year from 2011 through 2014. Exceedance frequency data is shown in Figure A-2. Additionally, the date and concentration (daily 1-hr max) of each exceedance is listed in Table A-1. For completeness, all measured daily maximum concentrations measured in 2011-2014 are plotted in Figure A-3. Note the monitor start dates are not identical; see Table 1-3.

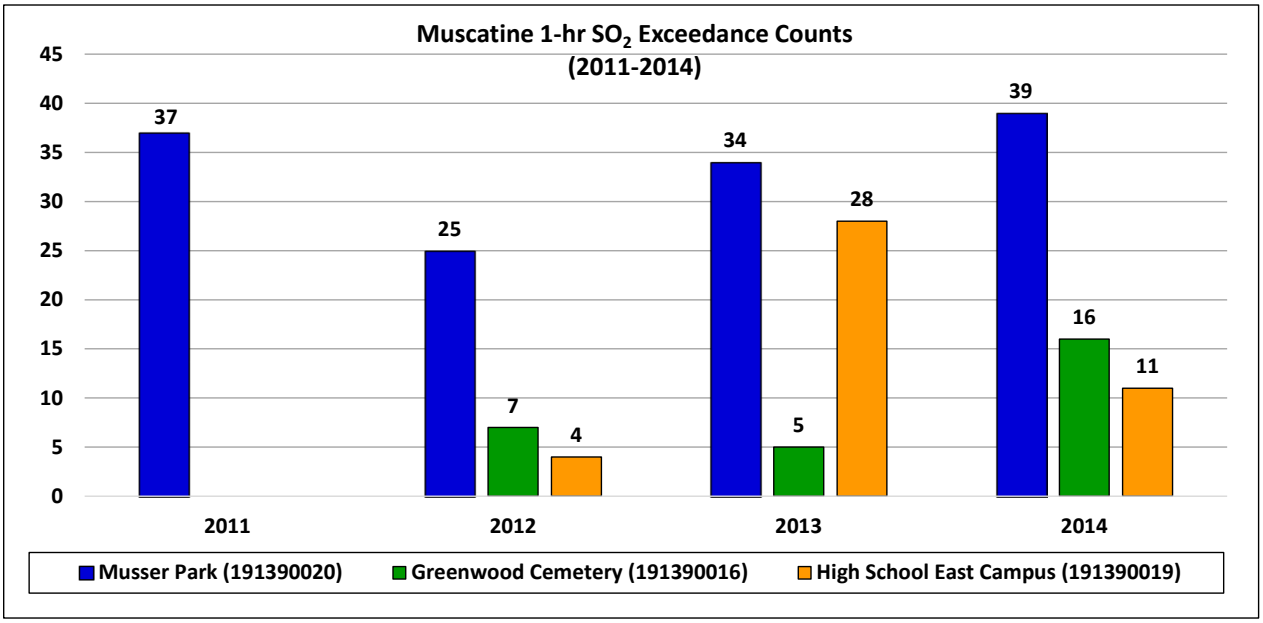


Figure A-1. Exceedance counts (days with a daily maximum 1-hr concentration greater than or equal to 75.5 ppb) at the Muscatine SO_2 monitors from 2011 through 2014.

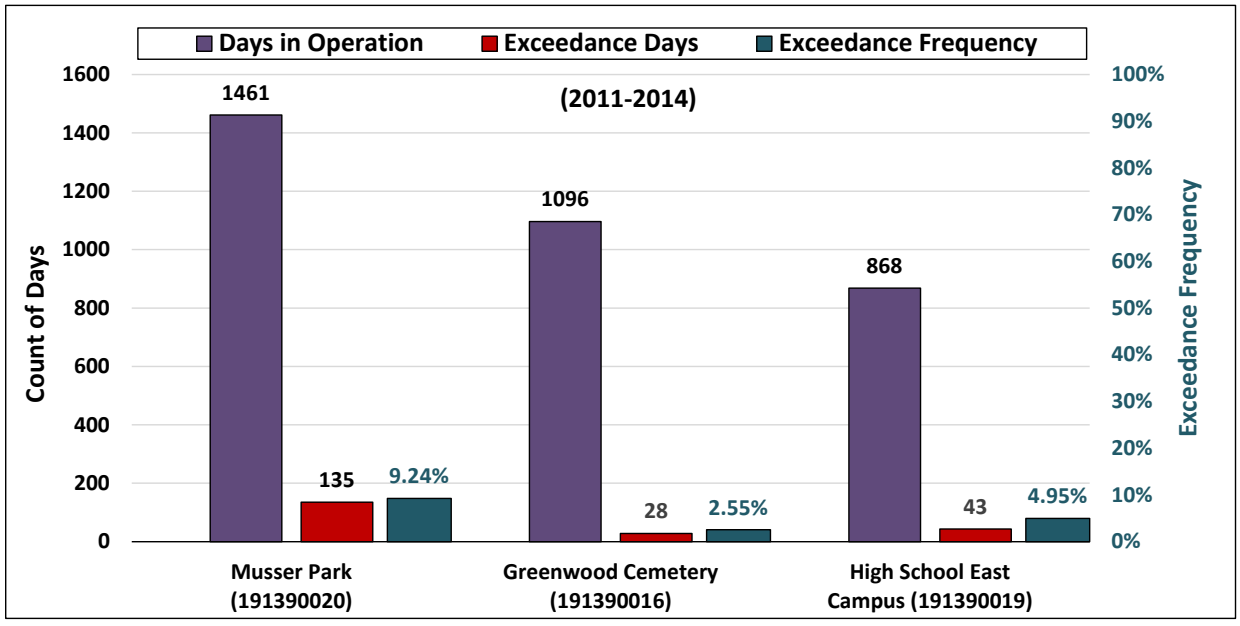


Figure A-2. Exceedance frequency by monitoring site, 2011-2014.

Table A-1. Measured exceedances, 2011-2014. (Colors used only to differentiate monitor locations.)

Date (2011)	Musser Park (191390020)
01/17/2011	175.5
02/17/2011	194.6
03/16/2011	146.6
03/17/2011	193.3
03/20/2011	96.1
04/03/2011	323
04/09/2011	143.7
04/10/2011	77.4
04/30/2011	224.4
05/05/2011	162.7
05/10/2011	111.5
05/21/2011	117.8
05/22/2011	208.8
05/30/2011	290.1
05/31/2011	230.9
06/03/2011	108.6
06/21/2011	95.6
07/09/2011	119.9
08/16/2011	129.7
08/23/2011	170.9
09/01/2011	99.6
09/20/2011	131.2
10/06/2011	91.6
10/07/2011	141.4
10/08/2011	103
10/25/2011	178.1
11/01/2011	199.9
11/02/2011	198.7
11/05/2011	114.5
11/06/2011	247.9
11/11/2011	110
11/12/2011	155.1
11/13/2011	209.8
11/18/2011	129.8
11/19/2011	309.3
11/24/2011	99.8
12/03/2011	233.7

Date (2012)	Musser Park (191390020)	Greenwood (191390016)	HS E. Campus (191390019)
01/03/2012	80.6		
01/15/2012	142.8		
01/16/2012	155.7		
01/18/2012	127.7		
02/26/2012	249.9	138.8	
03/06/2012	196.7	94.5	
03/07/2012	212.8		
03/12/2012	127.5		
03/16/2012	139.4	166.5	
03/17/2012	103.9		
03/18/2012	86.1		
03/19/2012	102.2	104.2	
03/20/2012	108.3	170.5	
03/22/2012		75.5	
03/27/2012	146.7		
05/11/2012	76.5		
05/18/2012	85.1		
09/11/2012	107.8		
10/12/2012			170.6
10/24/2012	130.5		
10/25/2012	177.8		
11/10/2012	308.8		
11/11/2012	229.7	78.7	
11/16/2012			79.2
11/22/2012	121.3		
12/03/2012	224		
12/05/2012			151.7
12/09/2012			125.5
12/12/2012	119		
12/15/2012	96.2		

Date (2013)	Musser Park (191390020)	Greenwood (191390016)	HS E. Campus (191390019)
01/08/2013	100.8		
01/10/2013			92.2
01/11/2013	145.8		
02/10/2013	119.1		
03/03/2013			139.2
03/04/2013			157.7
03/07/2013			156.9
03/08/2013			110
03/17/2013			112.8
03/22/2013			136
04/05/2013			146.8
04/06/2013	90.8		
04/07/2013			222.5
04/14/2013	178.5	94.3	109.8
04/20/2013			95.2
04/22/2013	143.8		
04/26/2013	75.7		
04/29/2013	132.2	106.5	
04/30/2013	88.6		
05/13/2013	96.6		
05/14/2013	101.5		
05/17/2013	87		90.9
05/19/2013	79.4		
05/27/2013			75.7
05/29/2013	188.5		
05/30/2013	237.1	104.8	
05/31/2013	133.1		
06/04/2013			198.6
06/05/2013			109.8
06/09/2013	96.2		
06/14/2013			86.6
06/20/2013		83.7	
06/21/2013	94.6		122.3
06/22/2013	159		
07/13/2013			91.6
07/29/2013			95.8
08/17/2013			164.8
08/20/2013	102.5		
08/25/2013	150.5		
09/03/2013	77.2		160.9
09/06/2013	102.7		96.2
09/08/2013			146.6
09/17/2013			109.4
09/23/2013			110
09/24/2013			88.5
09/27/2013	94.8		
09/28/2013	149.9		
09/30/2013	76.5		
10/03/2013	99.8		
10/04/2013	81.4		
10/11/2013	129.3	81.8	
10/12/2013	90.3		
10/14/2013			138
11/04/2013	155.6		
11/05/2013	111.4		
11/08/2013	131.1		
11/16/2013	184.4		
12/02/2013			125.1

Date (2014)	Musser Park (191390020)	Greenwood (191390016)	HS E. Campus (191390019)
01/03/2014	92.2		
01/12/2014	145.6		
03/26/2014	76	121.3	
03/27/2014	193.2		
03/30/2014	170.3	82.1	
03/31/2014	203.7		
04/12/2014	87.7		
04/17/2014	93.1		
04/18/2014			111
04/19/2014			139.8
04/23/2014			147.9
04/24/2014	94		235.9
04/27/2014			199.8
05/06/2014			202.2
05/07/2014	107.5		
05/19/2014	159.2	97.5	
06/01/2014	76.7		
06/06/2014		88.4	
06/14/2014	76.6	115.6	
06/15/2014	118.6	168.9	
06/16/2014	131	107.1	
06/17/2014	75.5		
06/27/2014	113.3	83.4	
06/28/2014	95.2		
06/30/2014	103.7		
07/20/2014	81.3	93.6	
07/21/2014		116.5	
07/22/2014	82.1		
07/25/2014	83.9		
08/07/2014			117.7
08/18/2014	87.3		
08/28/2014			112.6
08/29/2014	81		
08/31/2014		125.2	
09/03/2014	179.7	112	
09/04/2014	230.7		
09/08/2014	104.5		
09/09/2014	92.3		
09/19/2014	101.2		
09/22/2014			109
10/01/2014			116.7
10/12/2014			112.1
10/23/2014		88.1	
10/27/2014	79.4	109.9	
11/02/2014	166.8	109.2	
11/03/2014	158.7		
11/07/2014	124.5		
11/09/2014	93.2		
11/10/2014	124.1		
11/18/2014	78		
11/22/2014	98.7		
11/23/2014	76.1		
12/25/2014		99.6	
12/26/2014	104.4		

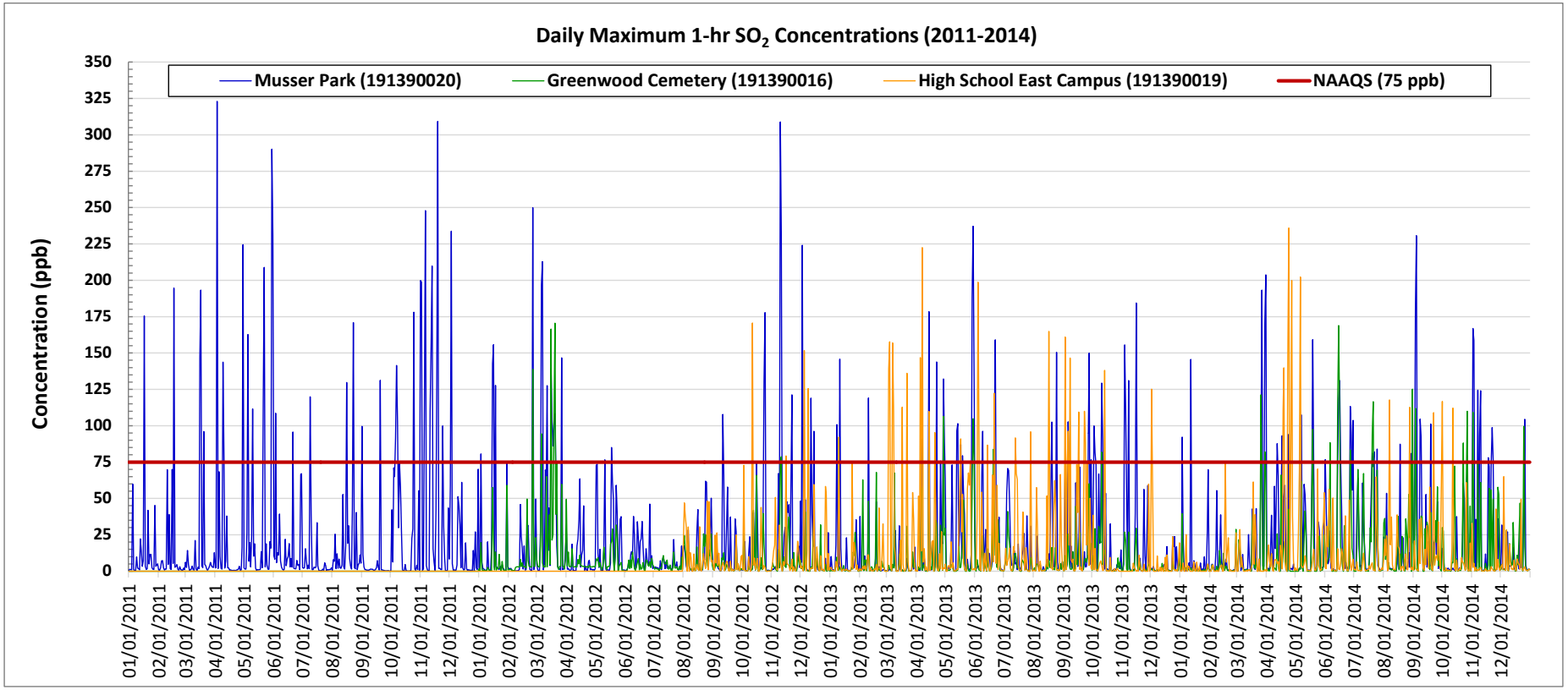


Figure A-3. Daily maximum 1-hr SO_2 concentrations measured in Muscatine from 2011-2014.

Appendix B. GPC Air Construction Permits

See separate attachment document.

Appendix C. MPW Air Construction Permits

See separate attachment document.

Appendix D. Monsanto Air Construction Permits

See separate attachment document.

Appendix E. Proof of Publication

E-1. SIP Public Notice

PROOF OF PUBLICATION

I, Jeff Lee, being duly sworn, on my oath, say that I am an advertising clerk at the *Muscatine Journal*, a newspaper of general circulation, published in the City of Muscatine, Muscatine County, Iowa; and that the following Notice:

Iowa Air Quality Bureau
Public Notice
SIP

Of which the annexed printed slip is a true, correct and complete copy, was published in said *Muscatine Journal* one time having been made there in on:

February 25, 2016

Jeff Lee

STATE OF IOWA
MUSCATINE COUNTY
25th day of February, 2016

Stefanie D. Trinh, Notary Public

Stefanie D. Trinh
Iowa Notarial Seal
Commission number 778997
My Commission Expires 06/20/2016

Fed ID #
42-0823980

Public Notice
Iowa Department of Natural Resources

THE Iowa Department of Natural Resources (DNR) is requesting public comment on the State of Iowa's state implementation plan (SIP) for the sulfur dioxide (SO_2) nonattainment area in Muscatine County, Iowa.

To protect human health the federal Clean Air Act (CAA) requires the U.S. Environmental Protection Agency (EPA) to set limits on the amount of pollution allowed in the air. These limits are called national ambient air quality standards (NAAQS) and they must be evaluated periodically and revised as necessary. In 2010, the EPA established a new 1-hour (hr) SO_2 NAAQS to reduce people's exposure to high short-term concentrations of SO_2.

Following any NAAQS revision EPA reviews air quality data submitted by the state and must designate as nonattainment any areas that do not meet the new NAAQS. On August 5, 2013, EPA published in the Federal Register (78 FR 47191) a nonattainment designation for a portion of Muscatine County for the 2010 1-hr SO_2 NAAQS. To address the nonattainment designation the CAA requires the state to develop a SIP revision that includes a control strategy providing for expeditious attainment of the 1-hr SO_2 NAAQS. The DNR collaborated with facilities in Muscatine to develop air pollution control measures that will permanently reduce SO_2 emissions and result in attainment of the 1-hr SO_2 NAAQS.

An electronic copy of the SIP document may be viewed at http://www.iowadnr.gov/airstakeholder. The SIP document will be under the Public Input section of the page in the area titled Muscatine 1-Hour SO_2 Nonattainment SIP. A copy of the document may also be viewed at the Musser Public Library, located at 304 Iowa Ave, in Muscatine, Iowa.

Any person may make written comments on the proposed SIP revisions on or before Thursday, March 31, 2016. Written comments should be directed to Matthew Johnson, Department of Natural Resources, Air Quality Bureau, 7900 Hickman Road, Suite 1, Windsor Heights, Iowa, 50324; by fax at 515-725-9501; or by electronic mail to Matthew.Johnson@dnr.iowa.gov.

A public hearing will be held on Wednesday March 30, 2016, at 3:00 p.m. at the Muscatine County Conservation Board's Environmental Learning Center, 3300 Cedar Street, in Muscatine. All comments must be received no later than 4:30 p.m. on Thursday, March 31, 2016.

Any person who intends to attend the public hearing and has special requirements such as those related to hearing or mobility impairment should contact Matthew Johnson at 515-725-9554 or at the e-mail address above to advise of any specific needs.

A responsiveness summary will be prepared by the DNR following the close of the public comment period. The responsiveness summary will include any written or oral comments received during the public participation process and the DNR's response to the comments. The responsiveness summary will be forwarded to EPA and available to the public as part of the final nonattainment SIP submission.

RECEIVED
FEB 29 2016
IDNR AIR QUALITY

E-2. Extension of Comment Period

PROOF OF PUBLICATION

I, Jeff Lee, being duly sworn, on my oath, say that I am an advertising clerk at the *Muscatine Journal*, a newspaper of general circulation, published in the City of Muscatine, Muscatine County, Iowa; and that the following Notice:

Iowa Air Quality Bureau
Public Notice - IDNR
Extending The Public Comment Period For The State Of Iowa's State Impementation Plan (SIP)

Of which the annexed printed slip is a true, correct and complete copy, was published in said *Muscatine Journal* one time having been made there in on:

April 5, 2016

Jeff Lee

STATE OF IOWA
MUSCATINE COUNTY

5th day of April, 2016

Stefanie D. Trinh, Notary Public

Stefanie D. Trinh
Iowa Notarial Seal
Commission number 778997
My Commission Expires 06/20/2016

Public Notice
Iowa Department of Natural Resources

THE Iowa Department of Natural Resources (DNR) is extending the public comment period for the State of Iowa's state implementation plan (SIP) for the sulfur dioxide (SO_2) nonattainment area in Muscatine County, Iowa.

The public comment period started on February 25, 2016, and was originally scheduled to end on March 31, 2016. The DNR is granting a request for a three week extension to the comment period. The comment period will now end at 4:30 p.m. on Thursday, April 21, 2016.

A public hearing was held on Wednesday, March 30, 2016, at 3:00 p.m. at the Muscatine County Conservation Board's Environmental Learning Center. A second public hearing will not be held.

Any person may make written comments on the proposed SIP revisions on or before Thursday, April 21, 2016. Written comments should be directed to Matthew Johnson, Department of Natural Resources, Air Quality Bureau, 7900 Hickman Road, Suite 1, Windsor Heights, Iowa, 50324; by fax at 515-725-9501; or by electronic mail to Matthew.Johnson@dnr.iowa.gov.

An electronic copy of the SIP document may be viewed at http://www.iowadnr.gov/airstakeholder. The SIP document will be under the Public Input section of the page in the area titled Muscatine 1-Hour SO_2 Nonattainment SIP. A copy of the document may also be viewed at the Musser Public Library, located at 304 Iowa Ave, in Muscatine, Iowa.

Fed ID#

42-0823980

RECEIVED
APR 08 2016
IDNR AIR QUALITY