Sulfur Dioxide Data Requirements Rule

2023 Annual Review

Iowa Department of Natural Resources
Environmental Services Division
Air Quality Bureau
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Des Moines, IA 50319

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Executive Summary

The Iowa Department of Natural Resources (DNR) prepared this report to satisfy the annual data review requirements of the *Data Requirements Rule for the 2010 1-Hour Sulfur Dioxide (SO_2) Primary National Ambient Air Quality Standard (NAAQS)*. The Data Requirements Rule (DRR) is a federal rule promulgated by the U.S. Environmental Protection Agency (EPA) on August 21, 2015.

The DRR mandates that air agencies document in a report due July 1 each year the recent annual SO_2 emissions of sources in each area where modeling of actual emissions served as the basis for designating that area attainment. The air agency must also provide a recommendation regarding whether additional modeling is needed to determine if each such area continues to meet the 2010 1-hour SO_2 NAAQS. These are ongoing requirements that must be addressed every year, unless the modeling results for an area meet certain criteria that exempt it from further review.

This is the seventh annual report for the DRR prepared by the DNR. The areas in Iowa that must be evaluated are Louisa County and Pottawattamie County. The DRR-listed source in Louisa County is MidAmerican Energy Company's (MidAmerican) Louisa Generating Station (LGS). The DRR-listed source in Pottawattamie County is MidAmerican's Walter Scott Jr. Energy Center (WSEC).

Based on documented reductions in annual SO_2 emissions, the DNR concludes that additional modeling is not needed to determine that Louisa County and Pottawattamie County both continue to attain the 2010 1-hour SO_2 NAAQS.

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1. Introduction

On August 21, 2015 (80 FR 51051), the U.S. Environmental Protection Agency (EPA) published the *Data Requirements Rule for the 2010 1-Hour Sulfur Dioxide (SO_2) Primary National Ambient Air Quality Standard (NAAQS)*. This rule, referred to as the Data Requirements Rule (DRR), includes provisions in 40 CFR 51.1205(b) that require the air agency to submit a report to EPA documenting recent SO_2 emissions in areas where modeling of actual SO_2 emissions served as the basis for designating the area attainment for the 75 part per billion (ppb) 2010 1-hour SO_2 NAAQS (75 FR 35519, June, 22, 2010). The report must include an assessment of the cause of any emissions increases from the previous year and a recommendation regarding whether additional modeling is needed to characterize air quality to determine whether an area meets or does not meet the 2010 1-hour SO_2 NAAQS. The first such report is due by July 1 of the calendar year after the effective date of an area's initial designation. Thereafter, the report must be submitted annually, by July 1 of each year.

1.1. Affected Areas

This stand-alone report is the seventh report prepared by the Iowa Department of Natural Resources (DNR) pursuant to the ongoing data review provisions of the DRR. There are two areas in Iowa that must be addressed at this time, Louisa County and Pottawattamie County, whose locations are indicated in Figure 1-1. These two counties were among those designated during the third round of SO_2 designations (83 FR 1098, January 9, 2018) and they each contain one facility that was identified by the DNR pursuant to 40 CFR 51.1203(a) as a source that was not located in a nonattainment area and had actual annual SO_2 emissions of 2,000 tons or more. The applicable source in Louisa County is MidAmerican Energy Company's (MidAmerican) Louisa Generating Station (LGS). In Pottawattamie County, the applicable source is MidAmerican's Walter Scott Jr. Energy Center (WSEC). The dispersion modeling conducted by the DNR that supported the attainment designations for these two areas was based, in part, on the use of actual emissions.

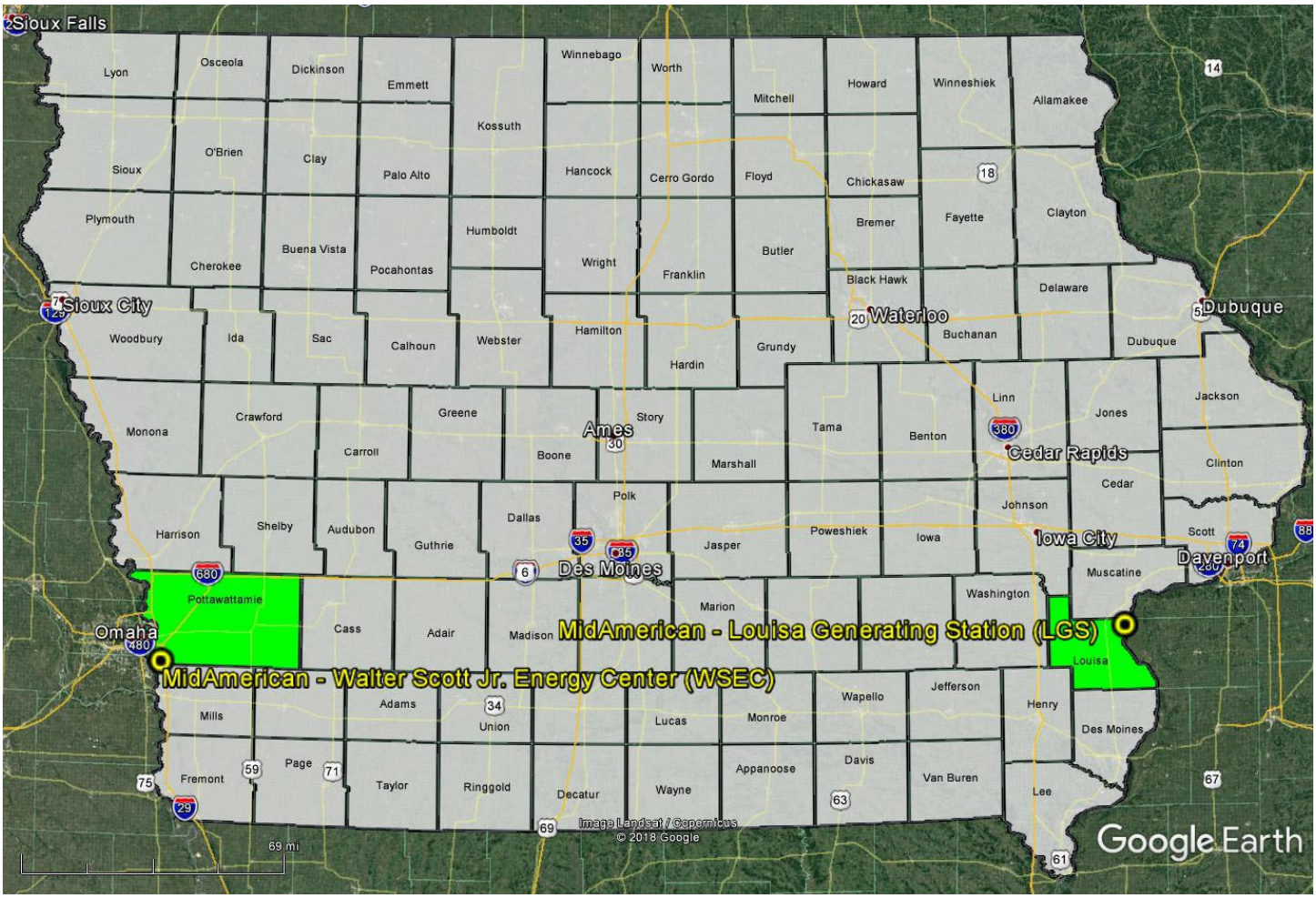

Figure 1-1. Locations of Louisa and Pottawattamie Counties and their DRR-listed source.

1.2. Unclassifiable Areas

The DNR also relied on dispersion modeling that used actual emissions to recommend an attainment designation for Linn County during the third round of designations for the 2010 1-hour SO_2 NAAQS. However, EPA finalized a designation of unclassifiable for Linn County and thus the DRR's ongoing data review provisions do not apply to this area. Although Woodbury County is also currently designated unclassifiable for the 1-hour SO_2 NAAQS, the ongoing data review provisions of the DRR will not apply should EPA act on the Governor's January 5, 2017, request to redesignate Woodbury County to attainment because the modeling supporting that request is based on federally enforceable maximum permitted allowable emission limits, and not actual emissions.

1.3. Report History and Exemptions

The sources that must be addressed in this report are the same as those discussed in the 2019, 2020, 2021, and 2022 reports. The DNR's first DRR report was completed in 2017. The sources and areas subject to review at that time were Interstate Power and Light's (IPL) Burlington Generating Station in Des Moines County and IPL's Ottumwa Generating Station in Wapello County. They remained the only sources/areas subject to review for the second DRR report, submitted in 2018.

The 2018 report did, however, differ significantly from the 2017 review because it contained new dispersion modeling results for both Burlington Generating Station/Des Moines County and Ottumwa Generating Station/Wapello County that exempted those sources/areas from further review in subsequent DRR reports. The 2018 report describes the exemption criteria and associated modeling in detail, and also includes a historical review of the DRR, identifies the DRR-listed sources in Iowa, and includes a summary of the first three[1] rounds of designations for the 2010 1-hour SO_2 NAAQS. All previous reports are available on the DNR's Air Quality Implementation Plans website.[2]

[1] A fourth, and final, round of initial designations for the 2010 1-hour SO_2 NAAQS was published by EPA in the Federal Register on March 26, 2021 (86 FR 16055; supplemented April 14, 2021, 86 FR 19576). The fourth round involved areas using new ambient air monitoring to characterize SO_2 concentrations around DRR sources, and any other remaining undesignated areas. There were no such areas in Iowa. EPA completed the initial designations process for Iowa during the third round of 1-hour SO_2 designations.

[2] On the Air Quality Implementation Plans page, the reports are located within the "Designation Recommendations" section, under the "2010 SO2 (Includes Muscatine 1-hour SO2 Nonattainment Area)" subsection.

2. Louisa County Review

MidAmerican Energy Company's Louisa Generating Station (LGS, facility ID 58-07-001) is the only source in Louisa County meeting the applicability requirements of the DRR. It was identified by the DNR in a letter to EPA dated December 15, 2015, as a source that was not located in a nonattainment area and whose most recent actual annual SO_2 emissions were 2,000 tons or more. At that time the 2014 annual emissions data were the most recent available and LGS's reported annual SO_2 emissions for 2014 were 8,783 tons.

Louisa Generating Station is an electric generating facility (power plant) with one coal-fired boiler having a maximum rated capacity of 8,000 MMBtu/hr. According to the Energy Information Agency's (EIA) 2018 Form EIA-860 data, LGS serves a generator with a nameplate capacity of 811.9 megawatts (MW) that began operating in 1983. The location of LGS is indicated in Figure 2-1.

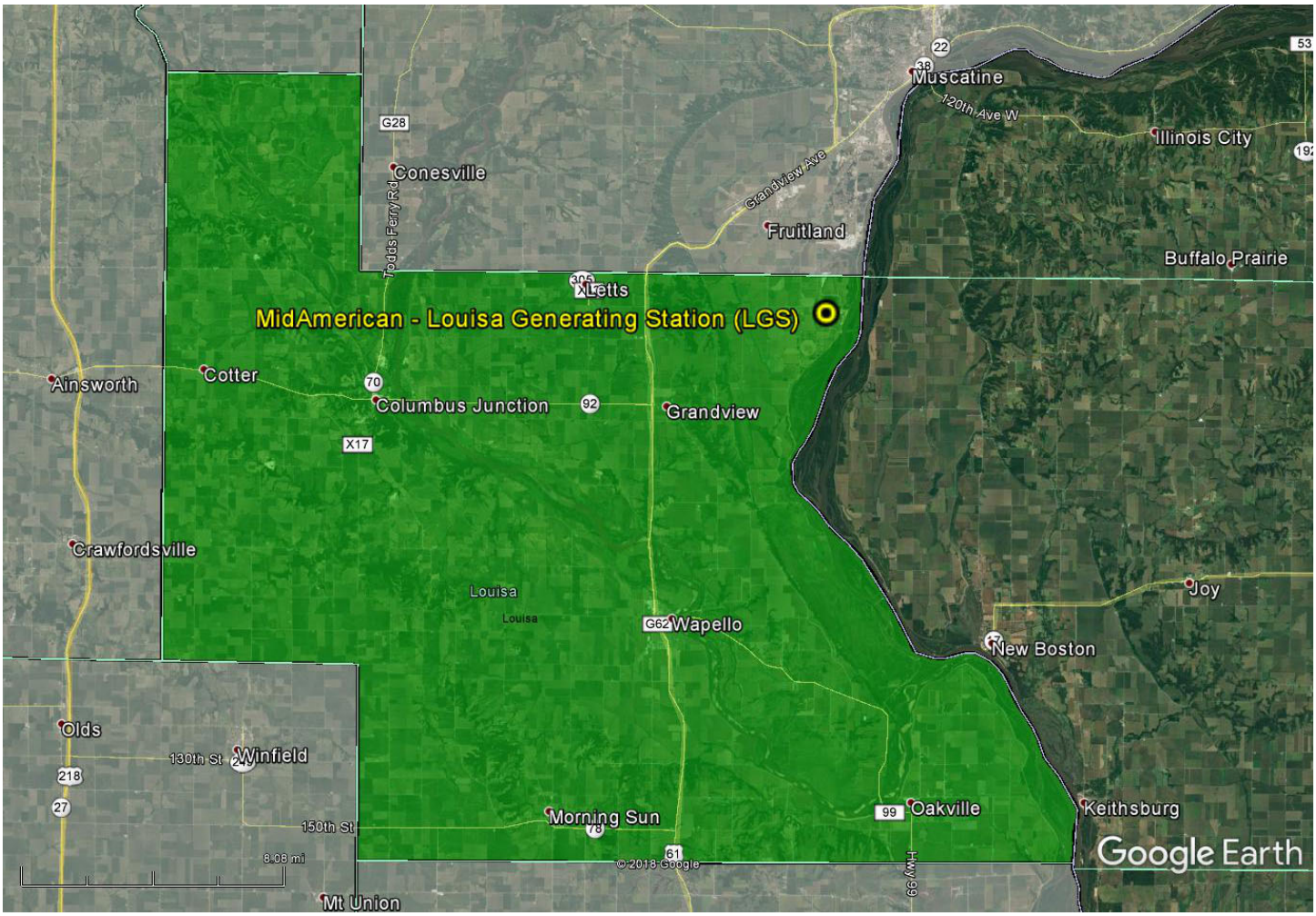

Figure 2-1. Location of MidAmerican's Louisa Generating Station. Louisa County is shaded in green and other counties in Iowa are shaded in white. Counties in Illinois are unshaded.

The largest SO_2 source at LGS is the coal-fired boiler. Two auxiliary boilers are also potential SO_2 sources, but under normal operation they are fired by natural gas and emit relatively little SO_2. The facility's emergency generator is an intermittent source that was excluded from the modeling analysis that supported the attainment designation. Its exclusion was justified pursuant to Section 5.5 of EPA's draft "*SO_2 NAAQS Designations Modeling Technical Assistance Document"* (referred to as the "Modeling TAD," most recently updated August 2016). A detailed description of the modeling analysis that supported the attainment designation for Louisa County is available in the DNR's revised technical support document (TSD)[3] for the third round of 1-hour SO_2 designations.

[3] *2010 1-Hour Sulfur Dioxide (SO_2) Standard, Round 3 Designations Recommendations and Data Requirements Rule, Technical Support Document*, Iowa DNR, dated December 19, 2016, and revised 4/3/2017.

As described in more detail in that TSD, the SO_2 emissions from facilities within 10 km of LGS were evaluated to identify additional sources to model. Three facilities within the Muscatine 1-hour SO_2 nonattainment area were included in the modeling analysis as a result. Those facilities are located in Muscatine County and include Grain Processing Corporation (GPC, facility ID 70-01-004), Muscatine Power and Water (MPW, facility ID 70-01-011), and Bayer CropScience LP[4] (facility ID 70-01-008), as shown in Figure 2-2. No additional relevant SO_2 sources were found by extending the search to areas within 10-20 km of LGS.

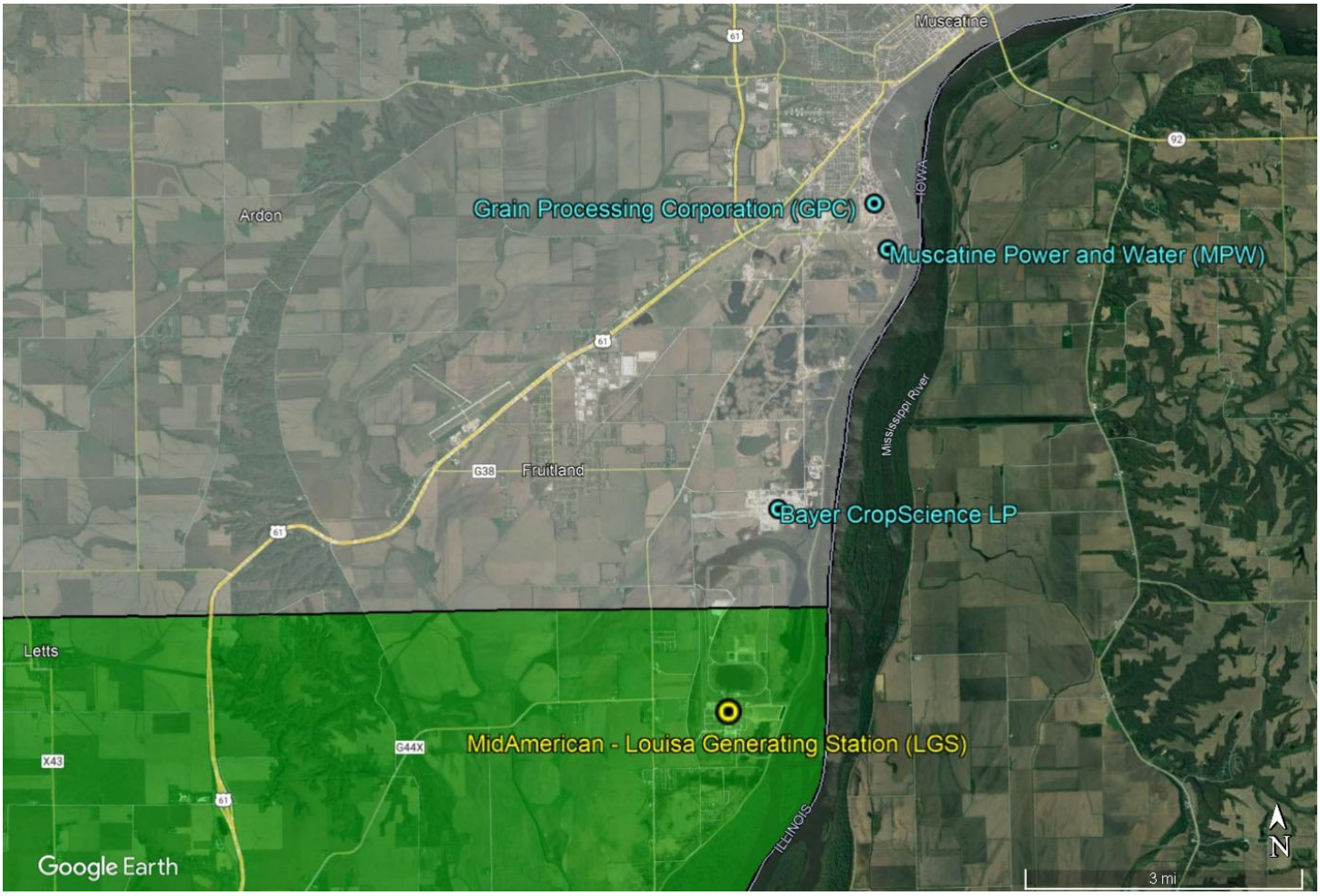

Figure 2-2. Location of GPC, MPW, and Bayer CropScience LP in relation to Louisa Generating Station. Louisa County is shaded green and Muscatine County is shaded white. Counties in Illinois are unshaded.

The facilities and their sources included in the modeling analysis that supported the attainment designation for Louisa County were the same as those included in the modeled attainment demonstration for the Muscatine 1-hour SO_2 nonattainment SIP.[5] Additionally, the modeling for Louisa County utilized the same stack parameters and, with the exception of one emission point, the same federally enforceable maximum permitted allowable emission limits used in the Muscatine 1-hour SO_2 attainment demonstration. The one exception was Boiler #8 (EP-195) at Bayer CropScience LP, whose modeled emission rate of 159.1 lb/hr was determined using the results of a stack test conducted on September 2, 2015.

The coal-fired boiler at LGS was modeled using its 1-hour critical emission value of 4,270.89 lb/hr. This value was derived from its 30-day rolling-average federally enforceable maximum permitted allowable emission limit using methods consistent with Section V.D.2 of EPA's April 23, 2014, *Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions*

[4] The Bayer CropScience LP facility was previously named Monsanto - Muscatine.

[5] A copy of the May 17, 2016, Muscatine 1-hour SO_2 Nonattainment SIP, and its appendices, can be found on the DNR's Air Quality Implementation Plans website, in the "Implementation Plans for Nonattainment and Maintenance Areas" section, under the "Muscatine 1-hour SO2 Nonattainment Area" subsection.

memorandum. The two auxiliary boilers at LGS were modeled using their federally enforceable maximum permitted allowable emission limits of 0.06 lb/hr. The emission rates for LGS, and the associated results of the modeling analysis that supported the attainment designation for Louisa County, are summarized in Table 2-1 and Table 2-2, respectively, and described in more detail in the TSD referenced in footnote 3.

Table 2-1. Louisa Generating Station modeled SO_2 emission rates.

Model ID	Unit Description	Modeled Emission Rate in lb/hr
EP01	Main Boiler (coal-fired)	4,270.89 (critical emission value)
EP02	Auxiliary Boiler 1 (natural gas)	0.06 (permit limit)
EP03	Auxiliary Boiler 2 (natural gas)	0.06 (permit limit)

Table 2-2. Summary of the model predicted concentration ($\mu g/m^3$) for the LGS analysis.[6]

Maximum Model Design Value	Background Concentration	Total Concentration	2010 1-Hour SO_2 NAAQS	Meets NAAQS
186.86	7	194	196	Yes

2.1. Emissions Assessment

When modeling of actual SO_2 emissions serves as the basis for designating an area attainment, the provisions of the DRR in 40 CFR 51.1205(b) require that the state document the annual SO_2 emissions of each applicable source in each such area and provide an assessment of the cause of any emissions increase from the previous year. Only emissions from Bayer CropScience LP's Boiler #8 need to be evaluated pursuant to this review. All other SO_2 sources at Bayer CropScience LP, and all the sources at LGS, MPW, and GPC, were modeled based on their federally enforceable maximum permitted allowable emission limits. Reviewing the actual emissions from these sources is uninformative and unwarranted pursuant to the DRR. Dispersion modeling has established that the permitted limits are protective of the 1-hour SO_2 NAAQS and compliance requires that actual emissions not exceed permitted limits.

For the affected source, the DRR requires a review of its most recent two years of annual SO_2 emissions, which currently would be 2021 and 2022. However, the DNR has found that evaluating only this data does not provide sufficient information to determine if additional modeling is needed, because it excludes the actual emissions data that was modeled to support the attainment designation. A more informative review that complies with the requirement of the DRR can be conducted for Bayer CropScience LP's Boiler #8 by including emissions data going back through the 2012-2014 modeled timeframe with the evaluation of the most recent two years.

Although Bayer CropScience LP is unique because the modeled emission rate of 159.1 lb/hr for Boiler #8 was obtained from a 2015 stack test, and not continuous emission monitoring system (CEMS) data, that stack test represented the best source of actual emissions information available at that time for that source, and was suitably representative of the 2012-2014 years modeled. To facilitate the necessary annual emissions review, the 159.1 lb/hr modeled emission rate is easily expressed as an annualized (ton per year) value because this source was modeled as operating continuously. Assuming a nominal 8760 hours of operation produces annualized SO_2 emissions of 696.9 tons. As shown in Figure 2-3, this exceeds all the reported annual SO_2 emissions for this source from any year within the 2012-2022 timeframe.

Comparing the most recent two years, as required by the DRR, reveals that the SO_2 emissions from Bayer CropScience LP's Boiler #8 increased by 0.01 tons between 2021 and 2022, from 0.13 to 0.14 tons per year. However, this fact is largely unimportant compared to the 99.9% reduction in SO_2 emissions that occurred between 2017 and 2018 as the result of a requested fuel switch from coal to natural gas. Natural gas combustion began on November 3, 2017, and thereafter the use of coal in Boiler #8 is prohibited by air construction permit number 82-A-092-P12.

[6] This modeling analysis, like the modeled attainment demonstration described in the Muscatine 1-hour SO_2 nonattainment SIP, included seven scenarios, depending upon which boilers (Units 7, 8, and 9) are operating at MPW. The results shown here reflect the scenario which produced the highest modeled impact (only Unit 7 operating).

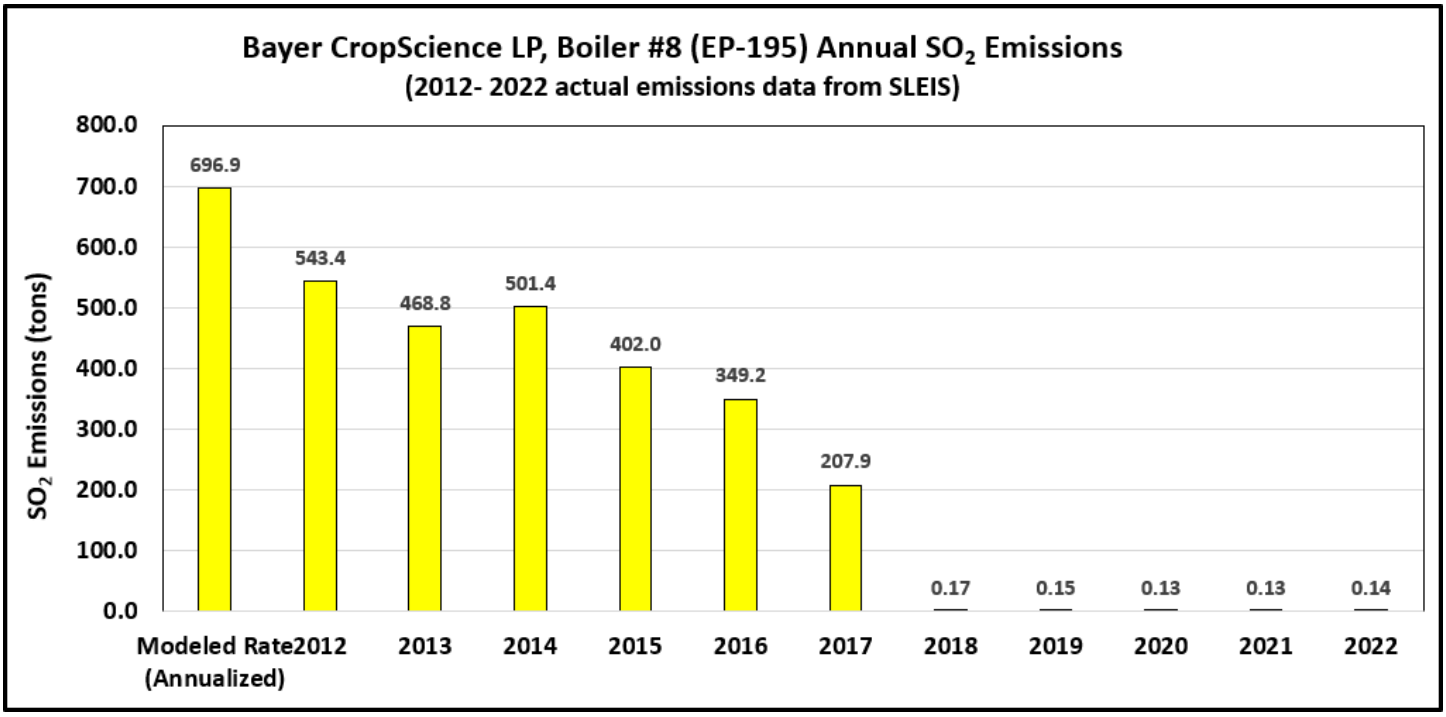

Figure 2-3. Annualized modeled and actual 2012-2021 SO_2 emissions (tons per year) from Boiler #8 at Bayer CropScience LP. Actual emissions data are from the DNR's State and Local Emissions Inventory System (SLEIS).

2.2. Recommendation

The state must provide a recommendation, pursuant to 40 CFR 51.1205(b)(1), regarding whether additional modeling is needed to characterize air quality in the area to determine whether the area meets or does not meet the 2010 1-hour SO_2 NAAQS. The modeling analysis that supported the attainment designation for Louisa County yielded a total maximum concentration of 194 µg/m^3 (see Table 2-2), meeting the 2010 1-hour SO_2 NAAQS. That analysis was based on Bayer CropScience LP's Boiler #8 combusting coal. Starting November 3, 2017, this unit is limited to burning only natural gas and therefore emits relatively little SO_2. Given this, and that all other sources in that analysis were modeled based on their federally enforceable maximum permitted allowable emission limits, additional modeling is not needed to determine that Louisa County still meets the 2010 1-hour SO_2 NAAQS.[7]

[7] To the extent necessary, this conclusion is also applicable to that portion of Muscatine County designated attainment in the third round of the 2010 1-hour SO_2 NAAQS designations. While the modeling analysis for Louisa Generating Station was focused on Louisa County, the receptor grid did extend slightly into portions of south-central Muscatine County, in a region just west of the western edge of the nonattainment boundary. The receptors in this region were generally no closer than 8 -10 km from an SO_2 source in the modeling analysis, and all yielded concentrations that met the 2010 1-hour SO_2 NAAQS.

3. Pottawattamie County Review

MidAmerican Energy Company's Walter Scott Jr. Energy Center (WSEC, facility ID 78-01-026) is the only source in Pottawattamie County meeting the applicability requirements of the DRR. It was identified by the DNR in a letter to EPA dated December 15, 2015, as a source that was not located in a nonattainment area and whose most recent actual annual SO_2 emissions were 2,000 tons or more. At that time the 2014 annual emissions data were the most recent available and WSEC's reported annual SO_2 emissions for 2014 were 13,749 tons.

Walter Scott Jr. Energy Center is an electric generating facility (power plant) with two coal-fired boilers, identified as Units 3 and 4.[8] Unit 3 has a maximum rated capacity of 7,700 MMBtu/hr and Unit 4 has a maximum rated capacity of 7,675 MMBtu/hr. According to the Energy Information Agency's (EIA) 2018 Form EIA-860 data, Unit 3 serves a generator with a nameplate capacity of 725.8 megawatts (MW) that began operating in 1978 and Unit 4 serves a generator with a nameplate capacity of 922.5 MW that began operating in 2007. The location of WSEC is indicated in Figure 3-1.

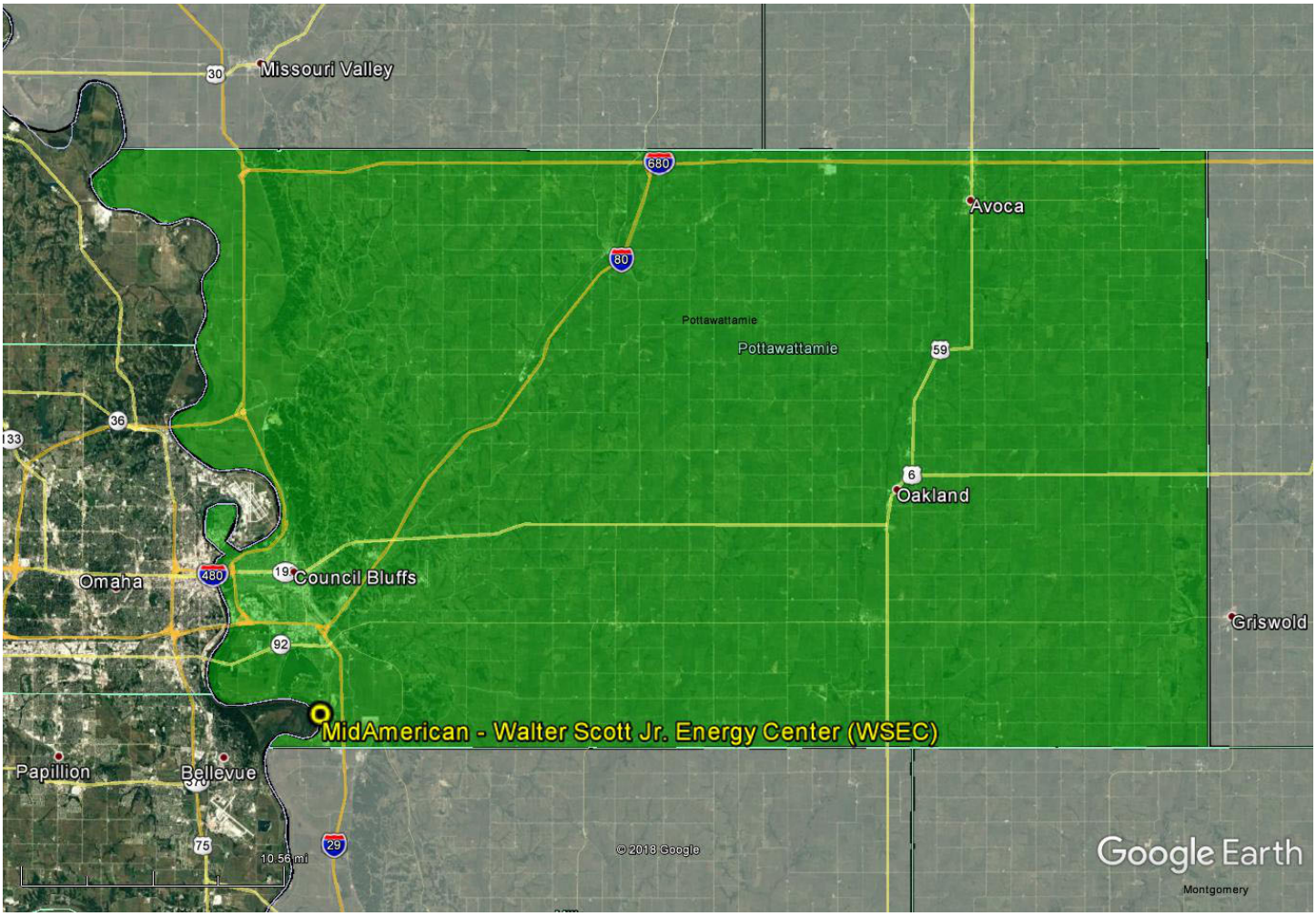

Figure 3-1. Location of MidAmerican's Walter Scott Jr. Energy Center. Pottawattamie County is shaded in green and other counties in Iowa are shaded in white. Counties in Nebraska are unshaded.

The largest SO_2 sources at WSEC are the two coal-fired boilers, Units 3 and 4. An auxiliary boiler is also a potential SO_2 source, but under normal operation it is fired by natural gas and emits relatively little SO_2. The facility's emergency generator is an intermittent source that was excluded from the modeling analysis that supported the attainment designation. Its exclusion was justified pursuant to Section 5.5 of EPA's draft "*SO_2 NAAQS Designations Modeling Technical Assistance Document*" (referred to as the "Modeling TAD," most recently updated August 2016). A detailed

[8] Two other coal-fired boilers at WSEC, identified as Units 1 and 2, were permanently shut down in 2015 and thus excluded from the modeling analysis that supported the attainment designation for Pottawattamie County.

description of the modeling analysis that supported the attainment designation for Pottawattamie County is available in the DNR's revised technical support document (TSD)[9] for the third round of 1-hour SO_2 designations.

As described in more detail in that TSD, the SO_2 emissions from facilities within 10 km of WSEC were evaluated to identify additional sources to model. No relevant SO_2 sources were found. The search was then extended to areas within 10-20 km of WSEC, and the Nebraska Department of Environmental Quality (NDEQ, now known as the Nebraska Department of Environment and Energy (NDEE)) identified two SO_2 sources. One source, Eppley Airfield, was excluded from the DNR's modeling analysis because its 2011 SO_2 emissions were only 36 tons and it was 18 km from WSEC. The other source, the Omaha Public Power District (OPPD) North Omaha facility, had SO_2 emissions large enough to warrant its inclusion in the DNR's modeling analysis for WSEC.[10]

The larger (by electrical generating capacity) of the two coal-fired boilers at WSEC, Unit 4, was modeled using its 1-hour critical emission value of 909.8 lb/hr. This value was derived from its 30-day rolling-average federally enforceable maximum permitted allowable emission limit using methods consistent with Section V.D.2 of EPA's April 23, 2014, *Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions* memorandum. The other coal-fired boiler, Unit 3, was modeled using its 2012-2014 actual hourly emission rates as measured using continuous emission monitoring system (CEMS) data. The natural gas auxiliary boiler was modeled using its federally enforceable maximum permitted allowable emission limit of 0.21 lb/hr. The emission rates for WSEC, and the associated results of the modeling analysis that supported the attainment designation for Pottawattamie County, are summarized in Table 3-1 and Table 3-2, respectively, and described in more detail in the TSD referenced in footnote 9.

Table 3-1. Walter Scott Jr. Energy Center modeled SO_2 emission rates.

Model ID	Unit Description	Modeled Emission Rate in lb/hr
EP003	Unit 3 Boiler (coal-fired)	2012 – 2014 variable actual hourly (CEMS)
EP141	Unit 4 Boiler (coal-fired)	909.8 (critical emission value)
EP142	Auxiliary Boiler (natural gas)	0.21 (permit limit)

Table 3-2. Summary of the model predicted concentration (µg/m^3) for the WSEC analysis.

Maximum Model Design Value	Background Concentration	Total Concentration	2010 1-Hour SO_2 NAAQS	Meets NAAQS
127.0	7	134	196	Yes

3.1. Emissions Assessment

When modeling of actual SO_2 emissions serves as the basis for designating an area attainment, the provisions of the DRR in 40 CFR 51.1205(b) require that the state document the annual SO_2 emissions of each applicable source in each such area and provide an assessment of the cause of any emissions increase from the previous year. Only emissions from WSEC Unit 3 need to be evaluated pursuant to this review. Unit 4 was modeled using its 1-hour critical emission value, which was derived from its federally enforceable maximum permitted allowable emission limit. The auxiliary boiler was also modeled using its federally enforceable maximum permitted allowable emission limit. Reviewing the actual emissions from these sources is uninformative and unwarranted pursuant to the DRR. Dispersion modeling has established that the permitted limits are protective of the 1-hour SO_2 NAAQS and compliance requires that actual emissions not exceed permitted limits.

For the affected source, the DRR requires a review of its most recent two years of annual SO_2 emissions, which currently would be 2021 and 2022. However, the DNR has found that evaluating only this data does not provide sufficient information to determine if additional modeling is needed, because it excludes the 2012-2014 actual emissions data that

[9] *2010 1-Hour Sulfur Dioxide (SO_2) Standard, Round 3 Designations Recommendations and Data Requirements Rule, Technical Support Document*, Iowa DNR, dated December 19, 2016, and revised 4/3/2017.

[10] The DNR modeled the OPPD North Omaha facility using actual emission rates (CEMS data) for its two coal-fired boilers. However, its emissions need not be evaluated pursuant to this review because: the North Omaha facility is 19 km from WSEC; it is located in Douglas County, Nebraska; the NDEE used ambient air quality monitoring to characterize peak 1-hour SO_2 concentrations in the area of that source; and EPA designated Douglas County as attainment/unclassifiable in round 4 (86 FR 16055, March 26, 2021).

was modeled to support the attainment designation. A more informative review that complies with the requirement of the DRR can be conducted for WSEC Unit 3 by including emissions data going back through the 2012-2014 modeled timeframe with the evaluation of the most recent two years.

The actual annual SO_2 emissions from WSEC Unit 3 for the years 2012-2022 are shown in Figure 3-2. This information was obtained on April 12, 2023, using the Clean Air Markets Program Data tool from EPA's Clean Air Markets Division (CAMD). Between 2021 and 2022 the SO_2 emissions from WSEC Unit 3 increased by 517 tons. This represents an emissions increase of 7.2% and it is largely attributable to a 2.5% increase in heat input combined with a 4.7% increase in the annual SO_2 emission rate, which rose from 0.376 lb/MMBtu in 2021 to 0.394 lb/MMBtu in 2022, as shown in Figure 3-3.

Of greater relevance to the attainment status of the area is that all the 2015-2022 annual SO_2 emission rates are lower than those from the 2012-2014 modeled timeframe. Across the 2012-2014 modeled timeframe, the annual SO_2 emissions from WSEC Unit 3 averaged 9,166 tons per year, while the 2022 actual annual emissions from WSEC Unit 3 were 7,753 tons. This represents an emissions decrease of 1,413 tons, or 15.4%. The decrease is largely due to a reduction in heat input.

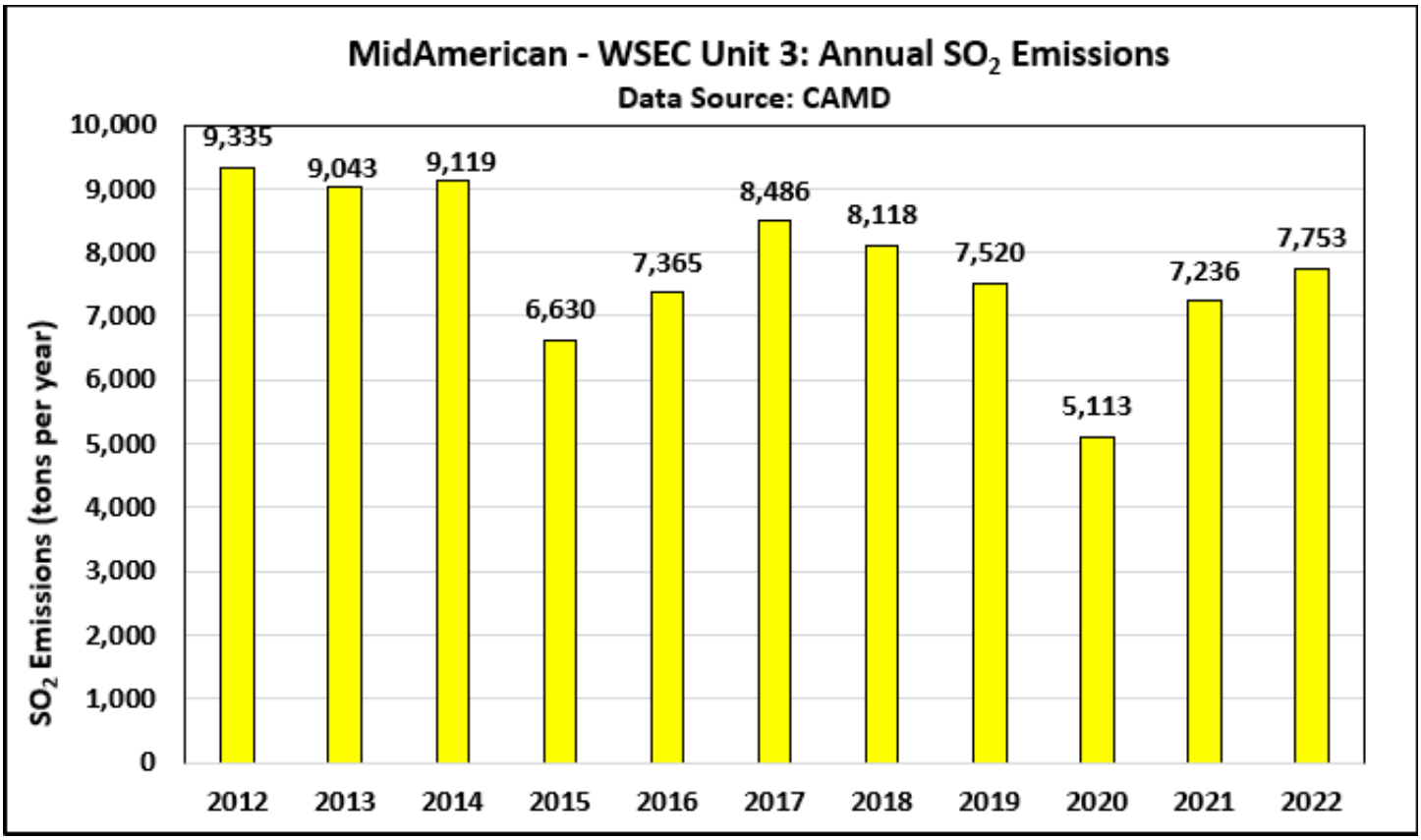

Figure 3-2. Annual 2012-2022 SO_2 emissions (tons per year) from Unit 3 at WSEC. Rounded to the nearest ton.

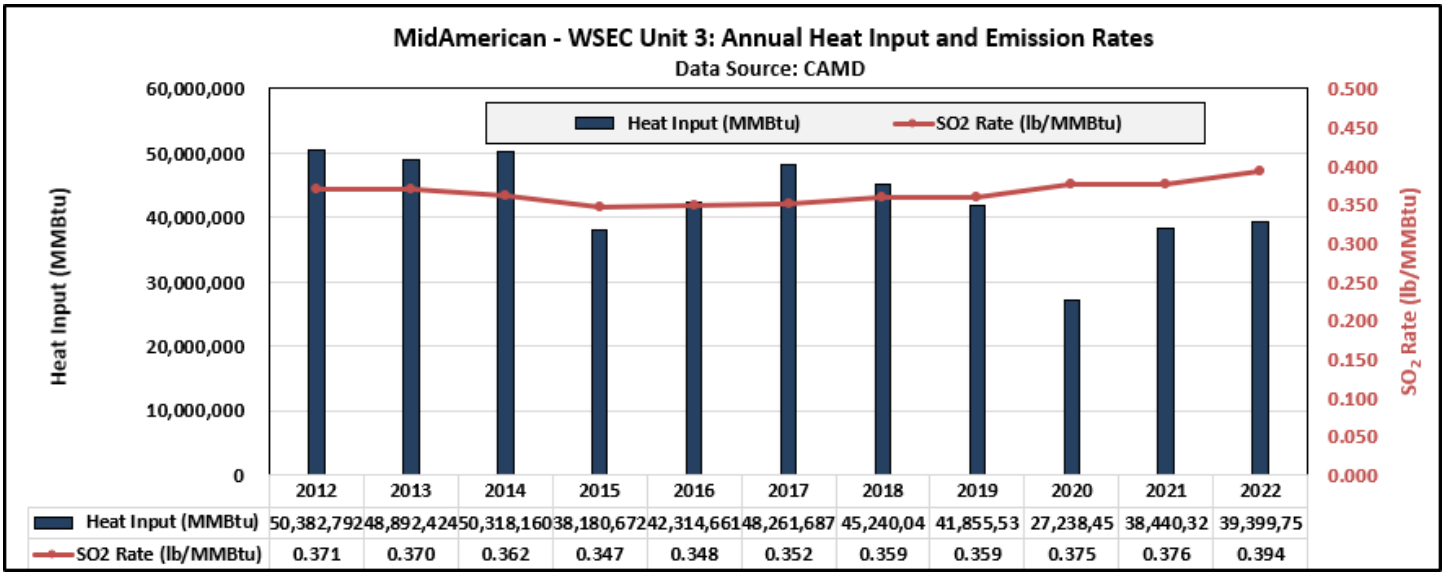

Figure 3-3. Annual 2012-2021 heat input (MMBtu) and SO_2 emission rates (lb/MMBtu) from Unit 3 at WSEC.

3.2. Recommendation

The state must provide a recommendation, pursuant to 40 CFR 51.1205(b)(1), regarding whether additional modeling is needed to characterize air quality in the area to determine whether the area meets or does not meet the 2010 1-hour SO_2 NAAQS. The modeling analysis that supported the attainment designation for Pottawattamie County used actual hourly emission rates from 2012-2014 for WSEC Unit 3 and yielded a total maximum concentration of 134 µg/m^3 (see Table 3-2), which is approximately 32% below the 2010 1-hour SO_2 NAAQS level of 75 ppb (~196 µg/m^3). The 2022 annual SO_2 emissions from Unit 3 are 7.2% higher than they were in 2021, however they are 15.4% lower than the average of the 2012-2014 annual emissions. Given this, and that all other sources at WSEC were modeled based on their federally enforceable maximum permitted allowable emission limits, additional modeling is not needed to determine that Pottawattamie County still meets the 2010 1-hour SO_2 NAAQS.