Sulfur Dioxide Data Requirements Rule

2017 Annual Review

Iowa Department of Natural Resources
Environmental Services Division

Air Quality Bureau
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Final
June 2017

i. Executive Summary

In 2016 the U.S. Environmental Protection Agency (EPA) completed the second round of designations for the 2010 1-hour sulfur dioxide (SO_2) national ambient air quality standard (NAAQS). In Iowa, EPA designated Des Moines and Wapello Counties as unclassifiable/attainment and Woodbury County as unclassifiable.

The attainment designations for Des Moines and Wapello Counties were based on modeling of actual SO_2 emissions. Under the federal Data Requirements Rule (DRR) a report must be submitted to EPA by July 1, 2017, documenting changes in SO_2 emissions and assessing the need for additional modeling in these two areas. No actions are required for Woodbury County.

This report, the first annual report required pursuant to the DRR, documents significant SO_2 emission reductions from sources in Des Moines and Wapello Counties. The Iowa Department of Natural Resources (DNR) therefore concludes that additional modeling is unnecessary to determine that Des Moines and Wapello Counties continue to attain the 1-hour SO_2 NAAQS.

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1. Introduction

On August 21, 2015, 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)* (DRR, 80 FR 51051). This rule includes provisions in 40 CFR 51.1205(b) that require the air agency to submit a report to EPA documenting SO_2 emissions in areas were modeling of actual SO_2 emissions served as the basis for designating the area attainment for the 2010 1-hour (hr) SO_2 NAAQS. 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. 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

On July 12, 2016, EPA published (81 FR 45039) the second round of designations for the 2010 1-hr SO_2 NAAQS. This action finalized designations effective September 12, 2016, for three areas in Iowa: Des Moines, Wapello, and Woodbury Counties (see Figure 1-1). Des Moines and Wapello Counties were designated unclassifiable/attainment while Woodbury was designated unclassifiable. Because the attainment designations for Des Moines and Wapello Counties were based on dispersion modeling that used actual emissions, the Iowa Department of Natural Resources (DNR) must submit a report to EPA by July 1, 2017. This document, the first such annual report, addresses the applicable reporting requirements of 40 CFR 51.1205(b).

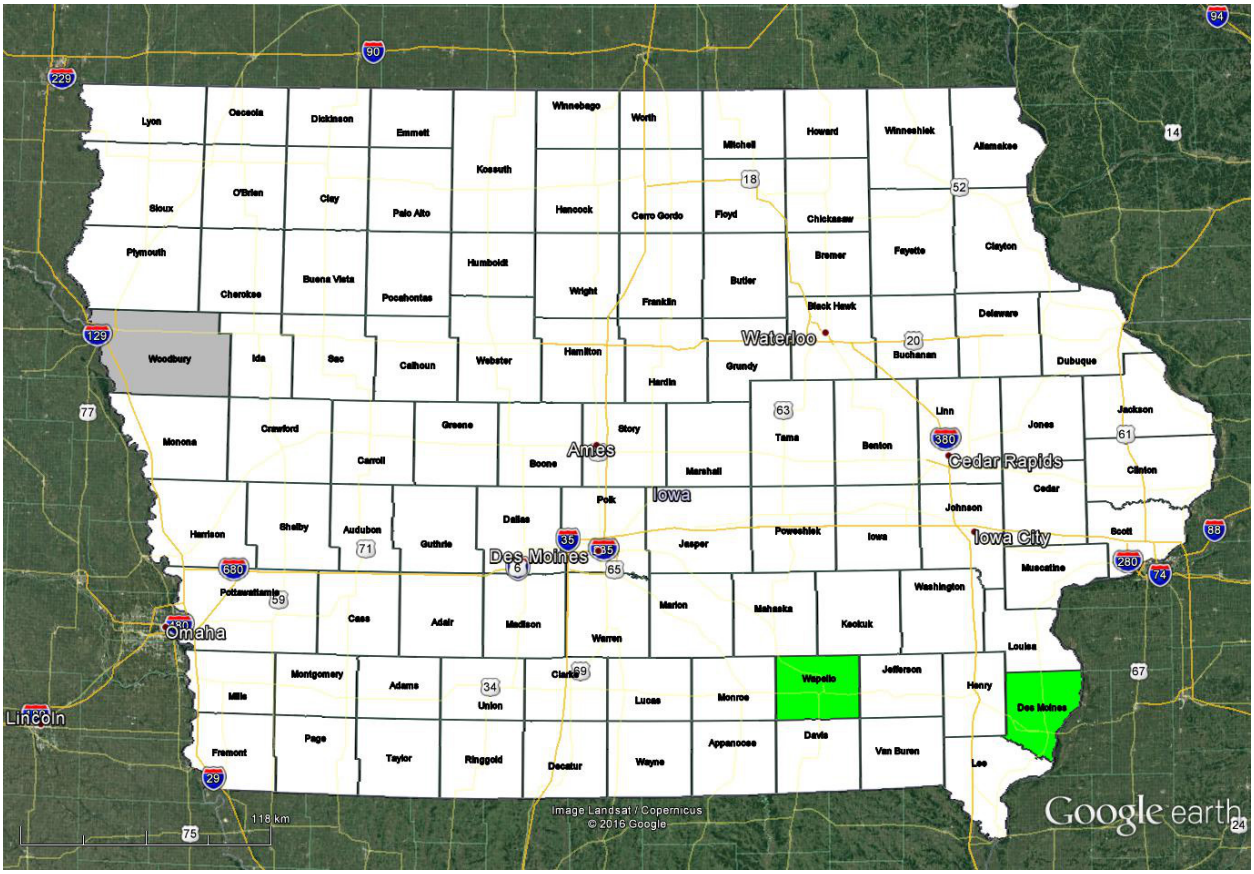

Figure 1-1. Locations of Des Moines, Wapello, and Woodbury Counties in Iowa. Shading differentiates designation: green = unclassifiable/attainment; gray = unclassifiable.

1.2 Background

On June 2, 2010, EPA signed a final rule (75 FR 35519, June 22, 2010) revising the SO_2 NAAQS. EPA established a new 1-hr SO_2 primary NAAQS of 75 parts per billion (ppb), based on the three-year average of the annual 99th percentile of daily 1-hr maximum concentrations.

Whenever EPA revises a NAAQS the Clean Air Act (CAA) requires EPA to designate areas as "attainment" (meeting), "nonattainment" (not meeting), or "unclassifiable" (insufficient data). Within one year of a NAAQS revision the Governor of each state must submit their designation recommendations. The CAA requires that EPA complete the designations process within three years of the NAAQS revision.

On August 5, 2013, EPA published (78 FR 47191) a final rule designating 29 areas in the U.S. as nonattainment for the 2010 1-hr SO_2 NAAQS. In that rulemaking, EPA committed to address, in separate future actions, the designations for all other areas for which it was not yet prepared to issue designations.[1]

Following the initial August 5, 2013, nonattainment designations, three lawsuits were filed against the EPA in different U.S. District Courts, alleging that EPA had failed to perform a nondiscretionary duty under the CAA by not designating all portions of the country by the June 2, 2013, deadline. To resolve the legal challenges a consent decree was entered in federal court on March 2, 2015, between EPA and plaintiffs Sierra Club and Natural Resources Defense Council.

The consent decree established deadlines for EPA to complete a second, third, and fourth round of designations for the 2010 1-hr SO_2 NAAQS. EPA completed the second round of designations in 2016. The third and fourth rounds must be completed by December 31, 2017, and December 31, 2020, respectively.[2]

1.2.1 Round 2 Designations

At this time, only areas designated under the second round of 1-hr SO_2 designations are potentially subject to the ongoing data requirements in 40 CFR 51.1205. This is generally true because, 1) the DRR's annual reporting requirements apply only to areas designated attainment; 2) the first round of designations identified only nonattainment areas, and 3) the third and fourth rounds of designations have not yet been completed.

Des Moines, Wapello, and Woodbury Counties were designated in the second round of 1-hr SO_2 designations because they contained sources meeting criteria established in the March 2, 2015, federal consent decree. For the second round, the consent decree required EPA to finalize (sign for publication in the federal register) designations by July 2, 2016, for areas containing any stationary source that had

[1] In 2013 EPA was still developing its strategy for completing the designations process. EPA anticipated using a hybrid approach, allowing the use of either modeling or monitoring data (using only monitoring data would require a prohibitively expensive SO_2 monitoring network), but EPA also anticipated the need for additional rulemaking and guidance documents.

[2] For the third round, all areas that have not installed and begun operating a new SO_2 monitoring network meeting EPA specifications by January 1, 2017, must be designated by December 31, 2017. In the fourth round, all remaining undesignated areas must be designated by December 31, 2020. To inform area designations in the final two rounds EPA is expected to use data that states have or will submit pursuant to the DRR. While the DNR has taken separate actions to fulfill requirements of the DRR related to designations under these later rounds, those actions are beyond the scope of this document.

not been announced for retirement and that according to the data in EPA's Air Markets Database emitted in 2012 either:

- more than 16,000 tons of SO_2; or
- more than 2,600 tons of SO_2 with an annual average emission rate of at least 0.45 lb/MMBtu.

According to EPA's March 20, 2015, letter to the Iowa DNR, the three sources listed in Table 1-1 met that criteria.

Table 1-1. Facilities in Iowa identified by EPA pursuant to the second round of 1-hr SO_2 designations.

Facility Name	Facility ID	County	2012 SO_2 Emissions (tons)†	2012 SO_2 Rate (lb/MMBtu)†
Burlington Generating Station	29-01-013	Des Moines	4,697	0.672
Ottumwa Generating Station	90-07-001	Wapello	11,985	0.666
George Neal South	97-04-010	Woodbury	14,273	0.638

†The 2012 emissions and emission rate data are from EPA's Clean Air Markets Division (CAMD).

In the March 20, 2015, letter EPA offered states an opportunity to submit revised designation recommendations. On November 4, 2015, the Governor recommended that Des Moines, Wapello, and Woodbury Counties be designated attainment. This amended recommendation was supported by dispersion modeling results that showed attainment with the 1-hr SO_2 NAAQS, as described in the associated technical support document (TSD).[3]

The DNR initially modeled both Burlington and Ottumwa Generating Stations using anticipated future emissions limits. When differences emerged between the permitting and designations timelines the modeling analyses and the TSD were revised to reflect the use of actual hourly emissions.[4] The updated modeling also showed attainment with the 1-hr SO_2 NAAQS and ultimately provided the technical basis for EPA's unclassifiable/attainment designations for Des Moines and Wapello Counties.

Since EPA's attainment designations for Des Moines and Wapello Counties are based on modeling of actual SO_2 emissions, the annual data review provisions of 40 CFR 51.1205(b) apply. The DNR must therefore review SO_2 emissions in Des Moines and Wapello Counties, recommend whether additional modeling is needed, and submit the first annual report by July 1, 2017.[5]

Although Woodbury County was also designated in the second round of 1-hr SO_2 designations, it was designated unclassifiable, thus the provisions of 40 CFR 51.1205(b) do not apply. The DNR will address the applicable requirements of 40 CFR 51.1205(b) as appropriate should EPA act on the Governor's January 5, 2017, request to redesignate Woodbury County to unclassifiable/attainment.

[3] The TSD was dated September 18, 2015, and is available at: https://www.epa.gov/sulfur-dioxide-designations/so2-designations-round-2-iowa-state-recommendation-and-epa-response and http://www.iowadnr.gov/Environmental-Protection/Air-Quality/Implementation-Plans

[4] The revised TSD was dated December 23, 2015, and is available at the websites listed in footnote 3.

[5] According to 40 CFR 51.1205(b)(2) an air agency will no longer be subject to the annual data review and reporting requirements for a particular area if an air quality modeling analysis demonstrates that air quality values at all receptors in the analysis are no greater than 50 percent of the 1-hour SO_2 NAAQS, and such demonstration is approved by the EPA Regional Administrator. The DNR may pursue this approach in the future but currently believes the most efficient methods to satisfying the requirements of 40 CFR 51.1205(b) are through the annual reporting provisions.

2. Des Moines County Review

Burlington Generating Station (BGS) is the only source in Des Moines County identified by EPA as meeting the applicability criteria for the second round of 2010 1-hr SO_2 designations in the March 2, 2015, federal consent decree. BGS is a coal-fired electric generating facility operated by Interstate Power and Light (IPL), a subsidiary of Alliant Energy. BGS's location is shown in Figure 2-1.

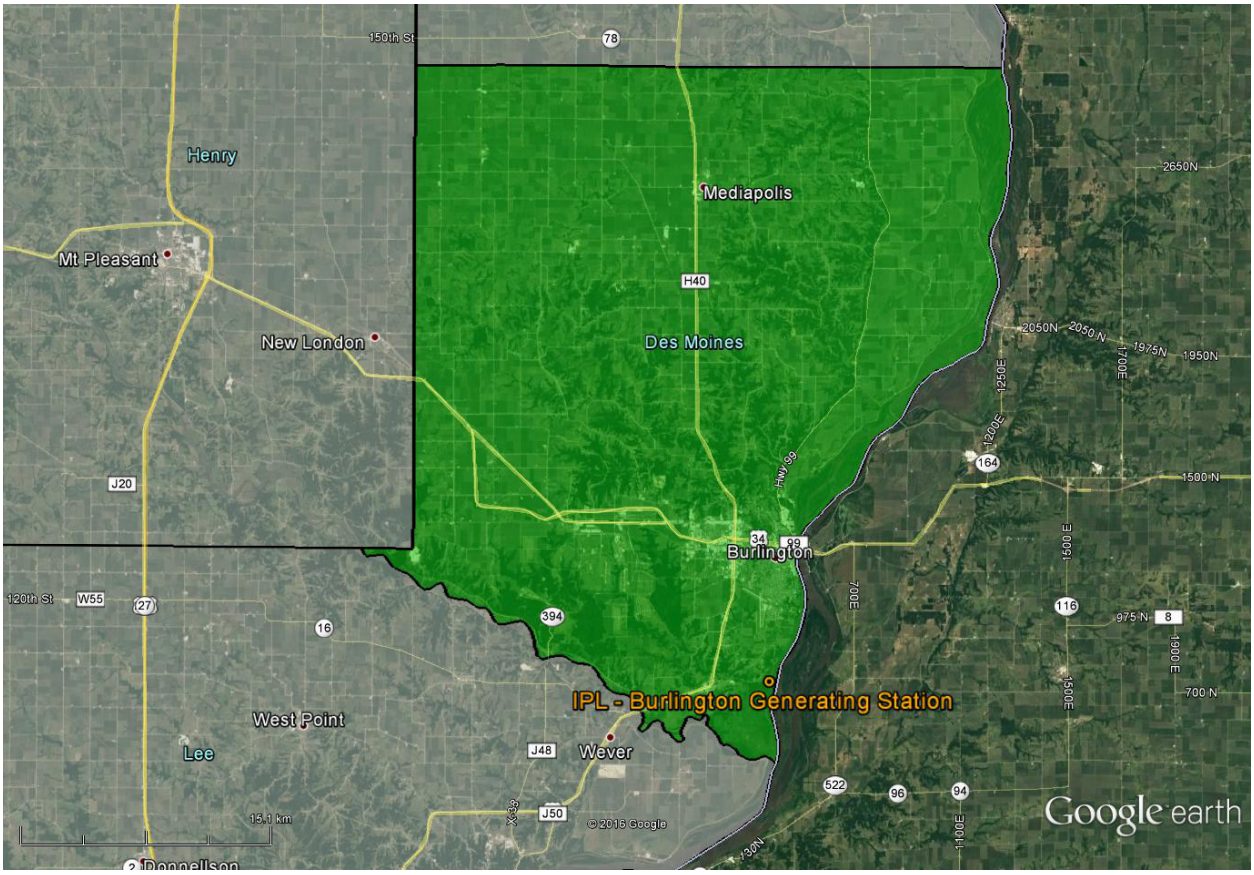

Figure 2-1. Location of IPL's Burlington Generating Station. Counties in Iowa are shaded.

The SO_2 emission sources at BGS are a coal-fired main boiler, a natural gas-fired auxiliary boiler for heating, and four natural gas combustion turbines. The facility's emergency generator is an intermittent emission source that was excluded from the modeling analysis pursuant to Section 5.5 of EPA's draft "*SO_2 NAAQS Designations Modeling Technical Assistance Document"* (TAD, August 2016).[6]

The SO_2 emission rates used in the modeling analysis that supported the attainment designation are summarized in Table 2-1. Emission rates were based on maximum permitted allowable emission rates, except for the main boiler. The main boiler was modeled using hourly actual emissions from 2012-2014. Results from the designations modeling analysis are reproduced in Table 2-2. (For a comprehensive review of that analysis see the TSD dated December 23, 2015, referenced in footnote 4 above.)

[6] The most recent version of the TAD is referenced here.

Table 2-1. SO_2 emission rates used in the Burlington Generating Station designations modeling analysis.

Model ID	SO_2 Emission Points	Rated Capacity (MMBtu/hr)	SO_2 Limit	Notes	Modeling Emission Rate (lb/hr)
EP01	Combustion Turbine #1 (NG)	288	1.8 lb/hr	Existing Limit	1.8
EP02	Combustion Turbine #2 (NG)	288	1.8 lb/hr	Existing Limit	1.8
EP03	Combustion Turbine #3 (NG)	288	1.8 lb/hr	Existing Limit	1.8
EP04	Combustion Turbine #4 (NG)	288	1.8 lb/hr	Existing Limit	1.8
EP16	Auxiliary (Aux.) Boiler (NG)	15	500 ppm	Conservative Limit†	0.9
EP17	Main Boiler (coal)	2077	1.0 lb/MMBtu	Actual Emissions	Varies Hourly‡

† The existing potential emission rate for the auxiliary boiler, EP16, is 0.009 lb/hr. The modeled emission rate, however, was conservatively higher as it reflected an earlier proposal to establish a new limit for this unit. There was no need to remodel this unit using the existing lower limit.

‡ The SO_2 emission rate for the main boiler, EP17, is based on actual reported CEMS data provided by IPL for the period 2012-2014.

Table 2-2. Concentrations ($\mu g/m^3$) from the Burlington Generating Station designations modeling analysis.

Model Design Value	Background Concentration	Total Concentration	1-Hour SO_2 NAAQS	Above NAAQS?
60.9	32	92.9	196	No

2.1 Emissions Assessment

Burlington Generating Station's annual actual SO_2 emissions from 2012-2016 are shown in Figure 2-2. The data was obtained using the CAMD Air Markets Program Data tool. The 2012-2016 timeframe was chosen because it encompasses the most recent annual emissions information as well as emissions from the 3-year period (2012-2014) orignally modeled for designation purposes. The CAMD data includes emissions from the main boiler only but this is the desired result. Because the combustion turbines were modeled using their maximum permitted emission rates and the auxiliary boiler was modeled using a conservative limit there is no need to review actual emissions from these sources. Additionally, these units are not a significant source of SO_2 as their actual emissions, in total, are always much less than 1 ton per year.

Between 2012 and 2016 actual SO_2 emissions decreased by 35% at BGS. Over that same timeframe the annual SO_2 emission rate decreased by 26%, from 0.67 lb/MMBtu to 0.50 lb/MMBtu, while the heat input decreased by only 13% (see Figure 2-3). This reflects a decrease in the sulfur content of the coal.

2.2 Recommendation

Considering the designations modeling results in combination with the steady decline in SO_2 emission from Burlington Generating Station, the DNR recommends that additional modeling is not needed to determine that Des Moines County still meets the 2010 1-hr SO_2 NAAQS.[7]

[7] This conclusion is also supported by emission reductions from the Iowa Army Ammunition Plant (IAAP). For round 2 designation purposes, SO_2 emissions from IAAP were evaluated using a screening approach (documented in the December 23, 2015, TSD). The 3-year period 2012-2014 was modeled using the maximum annual emission rate from that time, which came from 2012. The analysis showed attainment with the 1-hr SO_2 NAAQS. Since

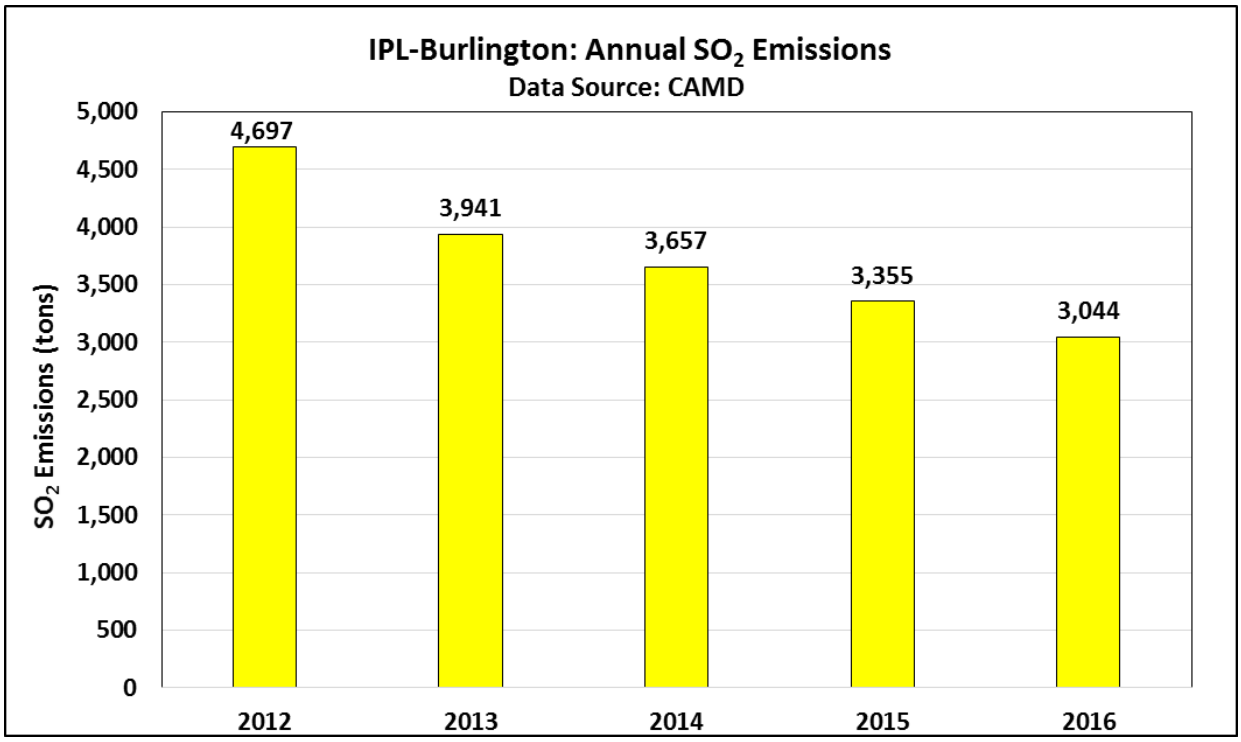

Figure 2-2. IPL-Burlington Generating Station annual SO_2 emissions.

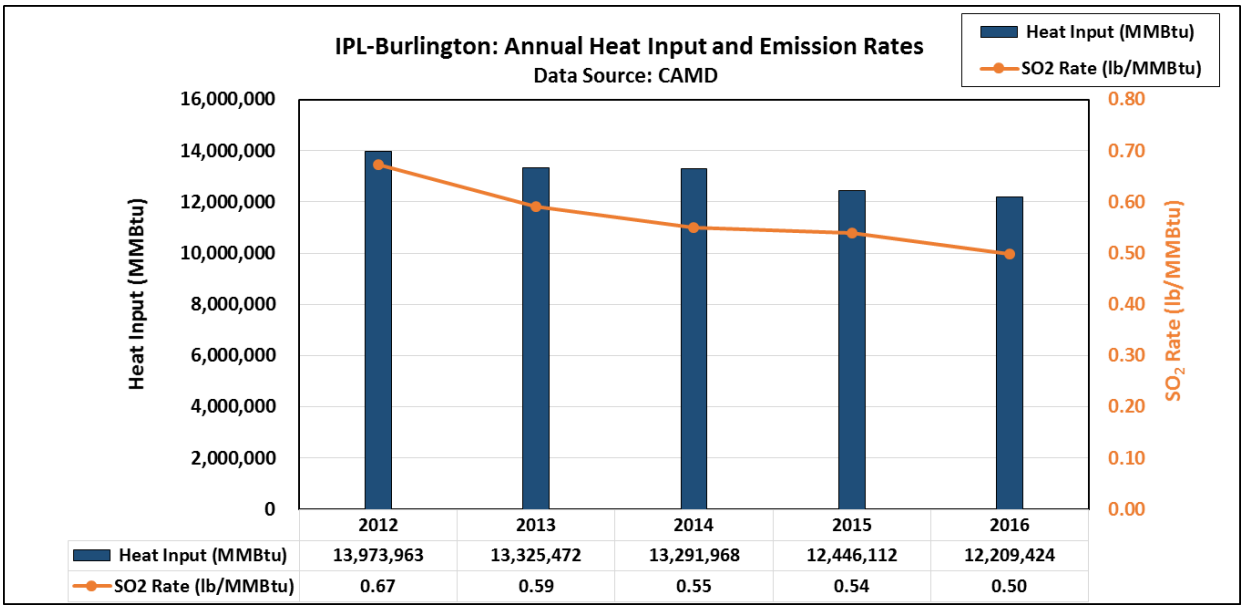

Figure 2-3. IPL-Burlington Generating Station annual SO_2 emission rates and heat input data.

IAAP's emissions have declined every year from 2012 through 2016 there is no need for further assessment. (IAAP's 2012-2016 annual SO_2 emissions are as follows: 753, 509, 504, 452, and 262 tons per year, respectively.)

3. Wapello County Review

Ottumwa Generating Station (OGS) is the only source in Wapello County identified by EPA as meeting the applicability criteria for the second round of 2010 1-hr SO_2 designations in the March 2, 2015, federal consent decree. OGS is a coal-fired electric generating facility operated by Interstate Power and Light (IPL), a subsidiary of Alliant Energy. OGS's location is shown in Figure 3-1.

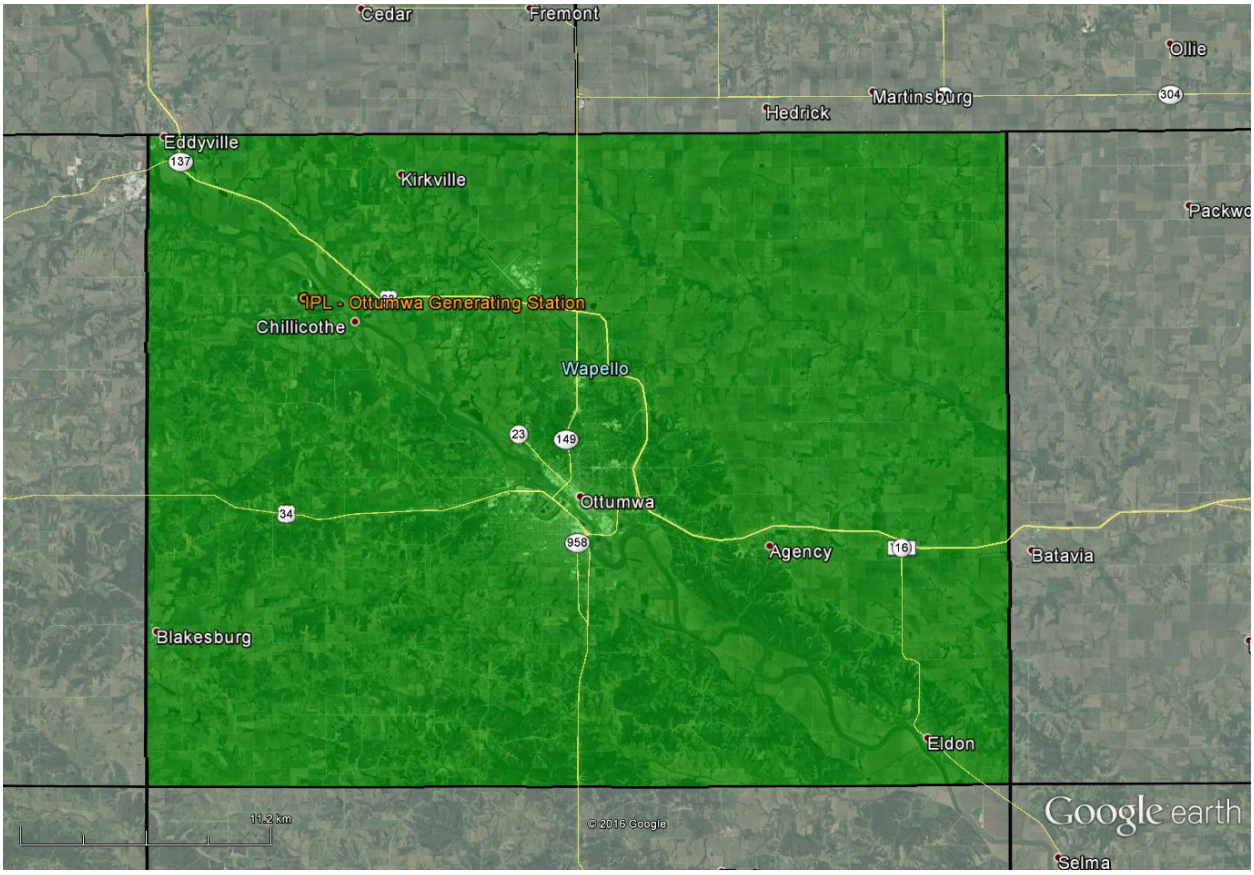

Figure 3-1. Location of IPL's Ottumwa Generating Station.

The SO_2 emission sources at OGS are a coal-fired main boiler and a fuel oil-fired auxiliary boiler for heating. The facility's emergency generator is an intermittent emission source that was excluded from the modeling analysis pursuant to Section 5.5 of EPA's draft "*SO_2 NAAQS Designations Modeling Technical Assistance Document*" (TAD, August 2016).[8] No other SO_2 sources in the area were identified for inclusion in the modeling analysis.

The SO_2 emission rates used in the modeling analysis that supported the attainment designation are summarized in Table 3-1. Emission rates were based on maximum permitted allowable emission rates, except for the main boiler. The main boiler was modeled using hourly actual emissions from 2012-2014. Results from the designations modeling analysis are reproduced in Table 3-2. (For a comprehensive review of that analysis see the TSD dated December 23, 2015, referenced in footnote 4 above.)

[8] The most recent version of the TAD is referenced here.

Table 3-1. SO_2 emission rates used in the Ottumwa Generating Station designations modeling analysis.

Model ID	SO_2 Emission Points	Rated Capacity (MMBtu/hr)	SO_2 Limit	Notes	Modeling Emission Rate (lb/hr)
EP1	Main Boiler	8669	0.2 lb/MMBtu	Actual Emissions	Varies Hourly‡
EP67	Plant Heat Boiler	77.413	0.10143 lb/MMBtu	Existing Operating Limit, 0.1% sulfur	7.852

‡ The SO_2 emission rate for the main boiler, EP1, is based on actual reported CEMS data provided by IPL for the period 2012-2014.

Table 3-2. Concentrations ($\mu g/m^3$) from the Ottumwa Generating Station designations modeling analysis.

Model Design Value	Background Concentration	Total Concentration	1-Hour SO_2 NAAQS	Above NAAQS?
107.4	32	139.4	196	No

3.1 Emissions Assessment

Ottumwa Generating Station's annual actual SO_2 emissions from 2012-2016 are shown in Figure 3-2. The data was obtained using the CAMD Air Markets Program Data tool. The 2012-2016 timeframe was chosen because it encompasses the most recent annual emissions information as well as emissions from the 3-year period (2012-2014) orignally modeled for designation purposes. The CAMD data includes emissions from the main boiler only but this is the desired result. Because the plant heat boiler was modeled using its maximum permitted emission rate there is no need to review actual emissions from this source. Additionally, this unit is not a significant source of SO_2 as actual emissions from the plant heat boiler are always much less than 1 ton per year.

Between 2013 and 2016 actual SO_2 emissions decreased by 92% at OGS. Over that same timeframe the annual SO_2 emission rate decreased by 93%, from 0.67 lb/MMBtu to 0.05 lb/MMBtu, while the heat input increased by 6% (see Figure 3-3). The SO_2 emission reductions are attributable[9] to a dry lime flue gas desulfurization (FGD) system that began operation on November 7, 2014.

3.2 Recommendation

Considering the designations modeling results in combination with the substantial SO_2 emission reductions from Ottumwa Generating Station, the DNR recommends that additional modeling is not needed to determine that Wapello County still meets the 2010 1-hr SO_2 NAAQS.

[9] The sulfur content of the coal may have decreased also, but this possibility did not warrant investigation.

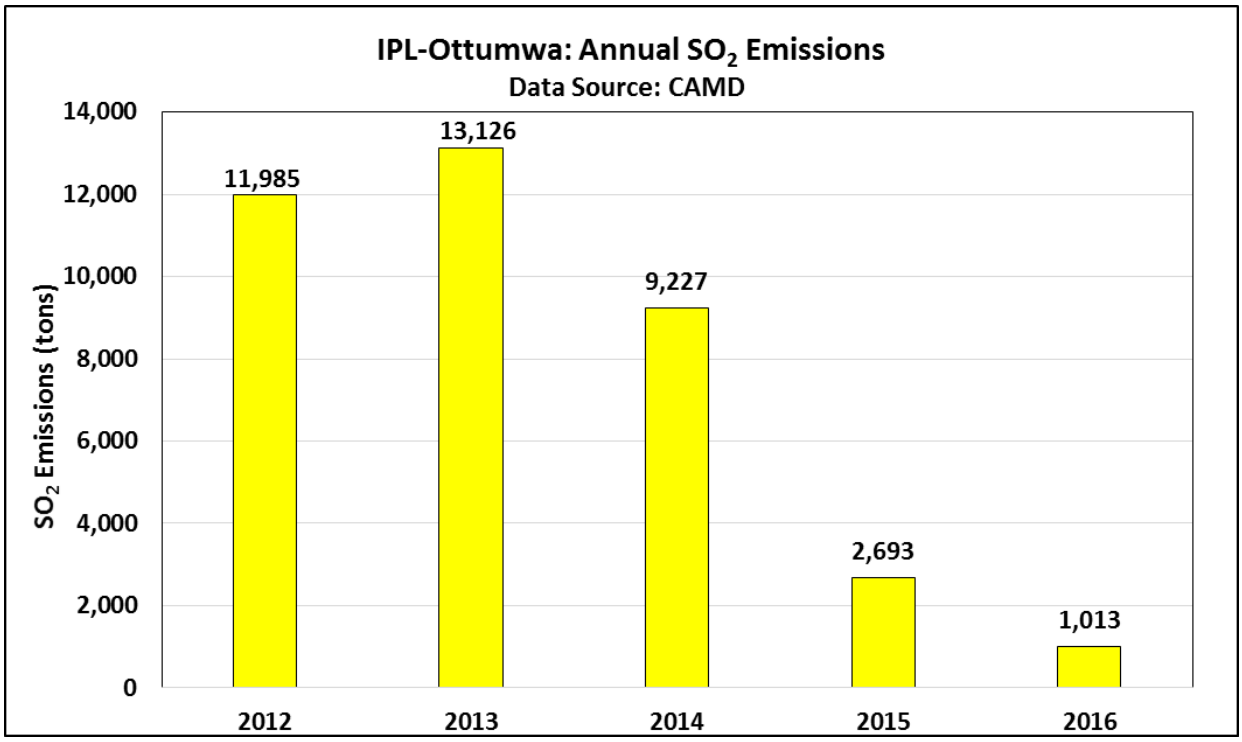

Figure 3-2. IPL-Ottumwa Generating Station annual SO_2 emissions.

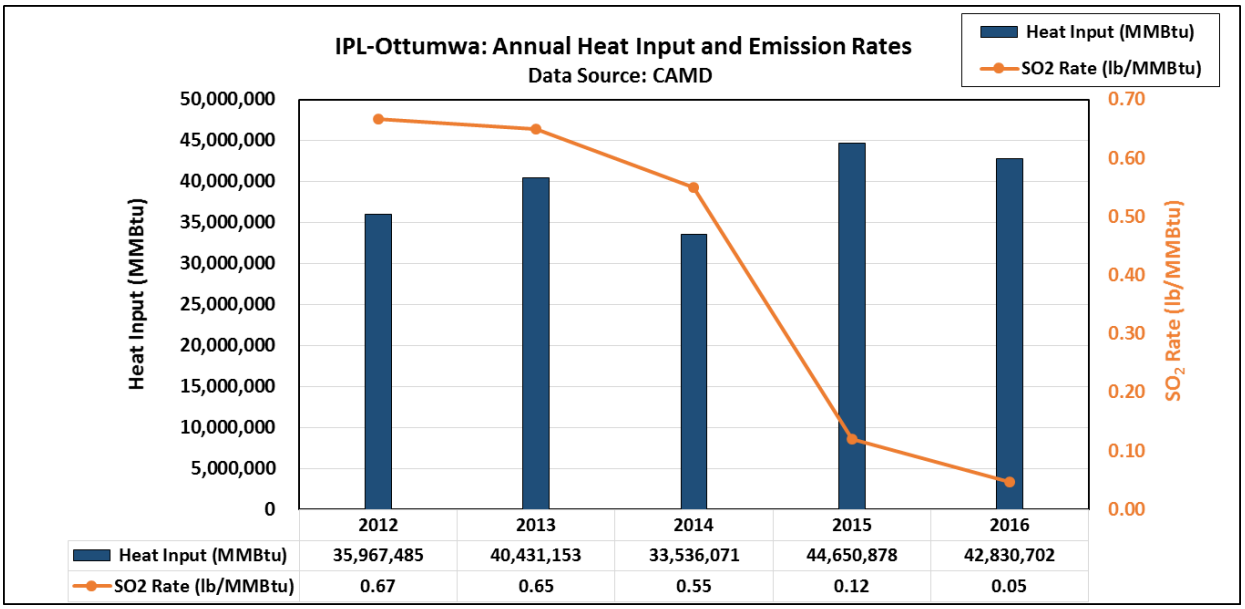

Figure 3-3. IPL-Ottumwa Generating Station annual SO_2 emission rates and heat input data.