Technical Support Document:

Chapter 29
Intended Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard for New York

1. Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (the EPA, we, or us) must designate areas as either "nonattainment," "attainment," or "unclassifiable" for the 2010 1-hour sulfur dioxide (SO_2) primary national ambient air quality standard (NAAQS) (2010 SO_2 NAAQS). The CAA defines a nonattainment area as an area that does not meet the NAAQS or that contributes to a nearby area that does not meet the NAAQS. An attainment area is defined by the CAA as any area that meets the NAAQS and does not contribute to a nearby area that does not meet the NAAQS. Unclassifiable areas are defined by the CAA as those that cannot be classified on the basis of available information as meeting or not meeting the NAAQS. In this action, the EPA has defined a nonattainment area as an area that the EPA has determined violates the 2010 SO_2 NAAQS or contributes to a violation in a nearby area, based on the most recent 3 years of air quality monitoring data, appropriate dispersion modeling analysis, and any other relevant information. An unclassifiable/attainment area is defined by the EPA as an area that either: (1) based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.[1] An unclassifiable area is defined by EPA as an area that either: (1) was required to be characterized by the state under 40 CFR 51.1203(c) or (d), has not been previously designated, and on the basis of available information cannot be classified as either: (i) meeting or not meeting the 2010 SO_2 NAAQS, or (ii) contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and EPA does have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.

This technical support document (TSD) addresses designations for nearly all remaining undesignated areas in New York for the 2010 SO_2 NAAQS. In previous final actions, the EPA

[1] The term "designated attainment area" is not used in this document because the EPA uses that term only to refer to a previous nonattainment area that has been redesignated to attainment as a result of the EPA's approval of a state-submitted maintenance plan.

has issued designations for the 2010 SO_2 NAAQS for selected areas of the country.[2] The EPA is under a December 31, 2017, deadline to designate the areas addressed in this TSD as required by the U.S. District Court for the Northern District of California.[3] We are referring to the set of designations being finalized by the December 31, 2017, deadline as "Round 3" of the designations process for the 2010 SO_2 NAAQS. After the Round 3 designations are completed, the only remaining undesignated areas will be those where a state has installed and begun timely operation of a new SO_2 monitoring network meeting EPA specifications referenced in EPA's SO_2 Data Requirements Rule (DRR) (80 FR 51052). The EPA is required to designate those remaining undesignated areas by December 31, 2020.

New York submitted its first recommendation regarding designations for the 2010 1-hour SO_2 NAAQS on June 1, 2011. The State submitted updated air quality analyses and updated recommendations on September 18, 2015,[4] and January 4, 2017[5]. In our intended designations, we have considered all the submissions from the State, except where a recommendation in a later submission regarding a particular area indicates that it replaces an earlier recommendation for that area we have considered the recommendation in the later submission.
For the areas in New York that are part of the Round 3 designations process, Table 1 identifies EPA's intended designations and the counties or portions of counties to which they would apply. It also lists New York's current recommendations. The EPA's final designation for these areas will be based on an assessment and characterization of air quality through ambient air quality data, air dispersion modeling, other evidence and supporting information, or a combination of the above.

Table 1. Summary of the EPA's Intended Designations and the Designation Recommendations by New York

Area/County[6]	New York's Recommended Area Definition	New York's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Monroe County	Full County	Attainment	Same as State's Recommendation	Unclassifiable
Albany County	Full County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
New York County	Full County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment

[2] A total of 94 areas throughout the U.S. were previously designated in actions published on August 5, 2013 (78 FR 47191), July 12, 2016 (81 FR 45039), and December 13, 2016 (81 FR 89870).
[3] *Sierra Club v. McCarthy*, No. 3-13-cv-3953 (SI) (N.D. Cal. Mar. 2, 2015).
[4] New York's September 2015 submittal addressed designation recommendations for Erie, Niagara, and Cattaraugus Counties.
[5] New York's January 2017 submittal addressed designation recommendations for all remaining counties in New York State except for Seneca, St. Lawrence, and Tompkins Counties
[6] Includes Indian country located in each area, if any, unless otherwise specified.

Area/County[6]	New York's Recommended Area Definition	New York's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Queens County	Full County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Bronx County	Full County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Kings County	Full County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Richmond County	Full County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Orange County	Full County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Suffolk County	Full County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Remaining Undesignated Areas to Be Designated in this Action	Full County	Attainment	Remaining Undesignated Areas to Be Designated in this Action*	Unclassifiable/ Attainment

* Except for areas that are associated with sources for which New York elected to install and began timely operation of a new, approved SO_2 monitoring network meeting EPA specifications referenced in the EPA's SO_2 DRR (*see* Table 2), the EPA intends to designate the remaining undesignated counties (or portions of counties) in New York as "unclassifiable/attainment" as these areas were not required to be characterized by the state under the DRR and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the areas may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS These areas that we intend to designate as unclassifiable/attainment (those to which this row of this table is applicable) are identified more specifically in section 8 of this TSD.

Areas for which New York elected to install and began operation of a new, approved SO_2 monitoring network are listed in Table 2. The EPA is required to designate these areas, pursuant to a court ordered schedule, by December 31, 2020. Table 2 also lists the SO_2 emissions sources around which each new, approved monitoring network has been established.

Table 2 – Undesignated Areas the EPA Is Not Addressing in this Round of Designations (and Associated Source or Sources)

Area	Source(s)
St. Lawrence County	Alcoa
Tompkins County	Cayuga Generating Station
Seneca County	Cayuga Generating Station
Cayuga County[7]	Cayuga Generating Station

Areas that the EPA previously designated unclassifiable in Round 1 (*see* 78 FR 47191) and Round 2 (*see* 81 FR 45039 and 81 FR 89870) are not affected by the designations in Round 3 unless otherwise noted. The two areas in New York, i.e., Erie and Niagara Counties, that the EPA previously designated unclassifiable/attainment in Round 2 are not affected by the designations in Round 3 unless otherwise noted.

2. General Approach and Schedule

Updated designations guidance documents were issued by the EPA through a July 22, 2016, memorandum and a March 20, 2015, memorandum from Stephen D. Page, Director, U.S. EPA, Office of Air Quality Planning and Standards, to Air Division Directors, U.S. EPA Regions I-X. These memoranda supersede earlier designation guidance for the 2010 SO_2 NAAQS, issued on March 24, 2011, and identify factors that the EPA intends to evaluate in determining whether areas are in violation of the 2010 SO_2 NAAQS. The documents also contain the factors that the EPA intends to evaluate in determining the boundaries for designated areas. These factors include: 1) air quality characterization via ambient monitoring or dispersion modeling results; 2) emissions-related data; 3) meteorology; 4) geography and topography; and 5) jurisdictional boundaries.

To assist states and other interested parties in their efforts to characterize air quality through air dispersion modeling for sources that emit SO_2, the EPA released its most recent version of a draft document titled, "SO_2 NAAQS Designations Modeling Technical Assistance Document" (Modeling TAD) in August 2016.[8]

Readers of this chapter of this TSD should refer to the additional general information for the EPA's Round 3 area designations in Chapter 1 (Background and History of the Intended Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard)

[7] The air monitors established to characterize air quality in the vicinity of the Cayuga Generating Station are located in Tompkins and Seneca Counties. Due to the close proximity of Cayuga County to the Cayuga Generating Station (i.e. approximately 2.5 km), and to the new air monitor in Tompkins County (approximately 1 kilometer), the EPA believes the Tompkins monitor will help determine any possible impacts in Cayuga County from the facility. The EPA will therefore designate Cayuga County in the next round of SO designations (i.e., designating by December 31, 2020). The EPA notes that New York recommended that Cayuga County be designated as attainment.

[2] https://www.epa.gov/sites/production/files/2016-06/documents/so2modelingtad.pdf. In addition to this TAD on modeling, the EPA also has released a technical assistance document addressing SO_2 monitoring network design, to advise states that have elected to install and begin operation of a new SO_2 monitoring network. See Draft SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, February 2016, https://www.epa.gov/sites/production/files/2016-06/documents/so2monitoringtad.pdf.

and Chapter 2 (Intended Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard for States with Sources Not Required to be Characterized).

As specified by the March 2, 2015, court order, the EPA is required to designate by December 31, 2017, all "remaining undesignated areas in which, by January 1, 2017, states have not installed and begun operating a new SO_2 monitoring network meeting EPA specifications referenced in EPA's" SO_2 DRR. The EPA will therefore designate by December 31, 2017, areas of the country that are not, pursuant to the DRR, timely operating EPA-approved and valid monitoring networks. The areas to be designated by December 31, 2017, include the areas associated with nine sources in New York either meeting DRR criteria (based on emissions or otherwise added to the DRR source list) that states have chosen to be characterized using air dispersion modeling, and other areas not specifically required to be characterized by the state under the DRR.

Because many of the intended designations have been informed by available modeling analyses, this preliminary TSD is structured based on the availability of such modeling information. With one exception (i.e., New York, Queens, Kings, Bronx, and Richmond Counties), there is a section for each county for which modeling information is available. There is one section for New York, Queens, Kings, Bronx, and Richmond Counties combined since five small generating stations that are in close proximity to one another in New York and Queens were modeled together to determine the cumulative impact, and the modeling results (i.e., receptor grid) extended over all five counties of the City of New York). The remaining to-be-designated counties are then addressed together in section 8.

The EPA does not plan to revise this TSD after consideration of state and public comment on our intended designation. A separate TSD will be prepared as necessary to document how we have addressed such comments in the final designations.

The following are definitions of important terms used in this document:

1) 2010 SO_2 NAAQS – The primary NAAQS for SO_2 promulgated in 2010. This NAAQS is 75 parts per billion (ppb), based on the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations. See 40 CFR 50.17.
2) Design Value - a statistic computed according to the data handling procedures of the NAAQS (in 40 CFR part 50 Appendix T) that, by comparison to the level of the NAAQS, indicates whether the area is violating the NAAQS.
3) Designated Nonattainment Area – an area that, based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined either: (1) does not meet the 2010 SO_2 NAAQS, or (2) contributes to ambient air quality in a nearby area that does not meet the NAAQS.
4) Designated Unclassifiable/Attainment Area – an area that either: (1) based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the

NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.

5) Designated Unclassifiable Area – an area that either: (1) was required to be characterized by the state under 40 CFR 51.1203(c) or (d), has not been previously designated, and on the basis of available information cannot be classified as either: (i) meeting or not meeting the 2010 SO_2 NAAQS, or (ii) contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.
6) Modeled Violation – a violation of the SO_2 NAAQS demonstrated by air dispersion modeling.
7) Recommended Attainment Area – an area that a state, territory, or tribe has recommended that the EPA designate as attainment.
8) Recommended Nonattainment Area – an area that a state, territory, or tribe has recommended that the EPA designate as nonattainment.
9) Recommended Unclassifiable Area – an area that a state, territory, or tribe has recommended that the EPA designate as unclassifiable.
10) Recommended Unclassifiable/Attainment Area – an area that a state, territory, or tribe has recommended that the EPA designate as unclassifiable/attainment.
11) Violating Monitor – an ambient air monitor meeting 40 CFR parts 50, 53, and 58 requirements whose valid design value exceeds 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.
12) We, our, and us – these refer to the EPA.

3. Technical Analysis for the Monroe County, New York Area

3.1. Introduction

The EPA must designate the Monroe County area by December 31, 2017, because the area has not been previously designated and New York has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of any source in Monroe County.

3.2. Air Quality Monitoring Data for the Monroe County Area

This factor considers the SO_2 air quality monitoring data in the area of Monroe County. The state included monitoring data from the following monitor:

- Air Quality System monitor (AQS ID 36-055-1007). This monitor is located at 30 Yarmouth Road in Rochester, New York, and is located approximately 11 kilometers southeast of the Recycled Energy Development (RED) facility at Eastman Business Park in Monroe County. Data collected at this monitor indicates a 2013-2015 design value of 18 ppb and a 2014-2016 design value of 22 ppb. However, this monitor was not sited to characterize the maximum 1-hour SO_2 concentrations near the RED facility. New York provided an air quality modeling analysis to characterize the area (see the air quality modeling section immediately below.) The EPA confirmed that there are no additional relevant data in AQS that could inform the intended designation action.

New York emphasized the Rochester monitor's design value as one of the factors for a state designation recommendation of attainment. The state also used the data from the Rochester monitor to determine background concentrations for the air dispersion modeling; the discussion of the modeling follows immediately below.

Table 3. SO_2 Monitor Design Values[9] – Monroe County Area

AQS ID	County, State	Distance from Eastman Business Park (kilometer [km])	Direction from Eastman Business Park	2011-2013 SO_2 Design Value (ppb)	2012-2014 SO_2 Design Value (ppb)	2013-2015 SO2 Design Value (ppb)	2014-2016 SO_2 Design Value (ppb)
36-055-1007	Monroe, NY	11	SE	20	20	18	22

[9] SO_2 Design values are defined as the 3-year average of the 99th percentile of the daily maximum 1-hour SO_2 concentrations. For example, the 2013-2015 design value, is an average of 2013, 2014, and 2015.

Data collected indicates SO_2 concentrations are below the NAAQS, and trending downward. The monitor is located on the southeastern side of the Rochester metropolitan area. Except for the RED facility at Eastman Business Park, there are no other point sources greater than 1 ton in Monroe County. The EPA has accepted air quality modeling from New York to assess air quality for the area.

3.3. Air Quality Modeling Analysis for the Monroe County Area Addressing Eastman Business Park (Recycled Energy Development (RED) – Rochester)

3.3.1. Introduction

This section 3.3 presents all the available air quality modeling information for a portion of Monroe that includes Eastman Business Park (Recycled Energy Development (RED) – Rochester). (This portion of Monroe will often be referred to as "the Monroe County area" within this section 3.3.) RED is the only source in the area subject to DRR requirements, which require New York to either characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

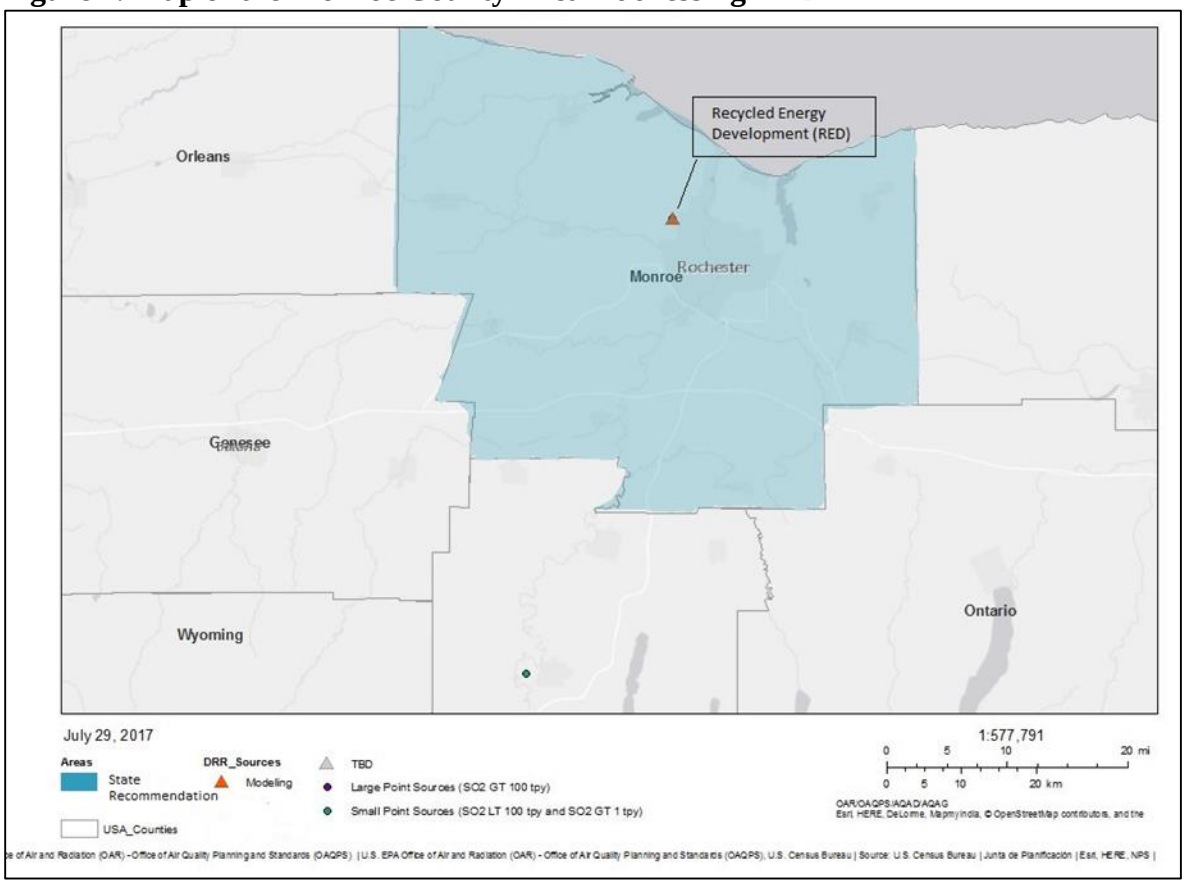
- The RED facility emits 2,000 tons or more annually. Specifically, RED emitted 10,188 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and New York has chosen to characterize it via modeling.

In its submission, New York recommended that an area that includes the area surrounding the facility, specifically the entirety of Monroe County, be designated as attainment based in part on an assessment and characterization of air quality impacts from this facility. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing proposed future allowable emissions as discussed later in this section. After careful review of the State's assessment, supporting documentation, and all available data, the EPA intends to modify the State's recommendation and designate the area as unclassifiable. Our reasoning for this conclusion is explained in a later section of this TSD, after all the available information is presented.

As seen in Figure 1 below, the RED facility is located in Monroe County, in the Eastman Business Park in Rochester, New York, approximately 6 km northwest of Rochester's central business district. The closest residences lie about 250 meter (m) southwest of the stacks, and a high school is located just over 500 m south-southwest of the facility. As seen in the figure, there are no other nearby point sources.

Also included in the figure is the area that the State recommends as attainment for the designation, i.e. the entirety of Monroe County. As will be shown in a figure in the section below that summarizes our intended designation, the EPA intends to apply a designation of unclassifiable to the same area.

Figure 1. Map of the Monroe County Area Addressing RED



The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA's July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

For this area, the EPA received and considered the modeling assessment from New York. The EPA has not conducted its own modeling of this area, and the EPA has not received modeling of this area from any other parties.

3.3.2. Modeling Analysis Provided by the State

3.3.2.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

- AERMOD: the dispersion model
- AERMAP: the terrain processor for AERMOD
- AERMET: the meteorological data processor for AERMOD
- BPIPPRM: the building input processor

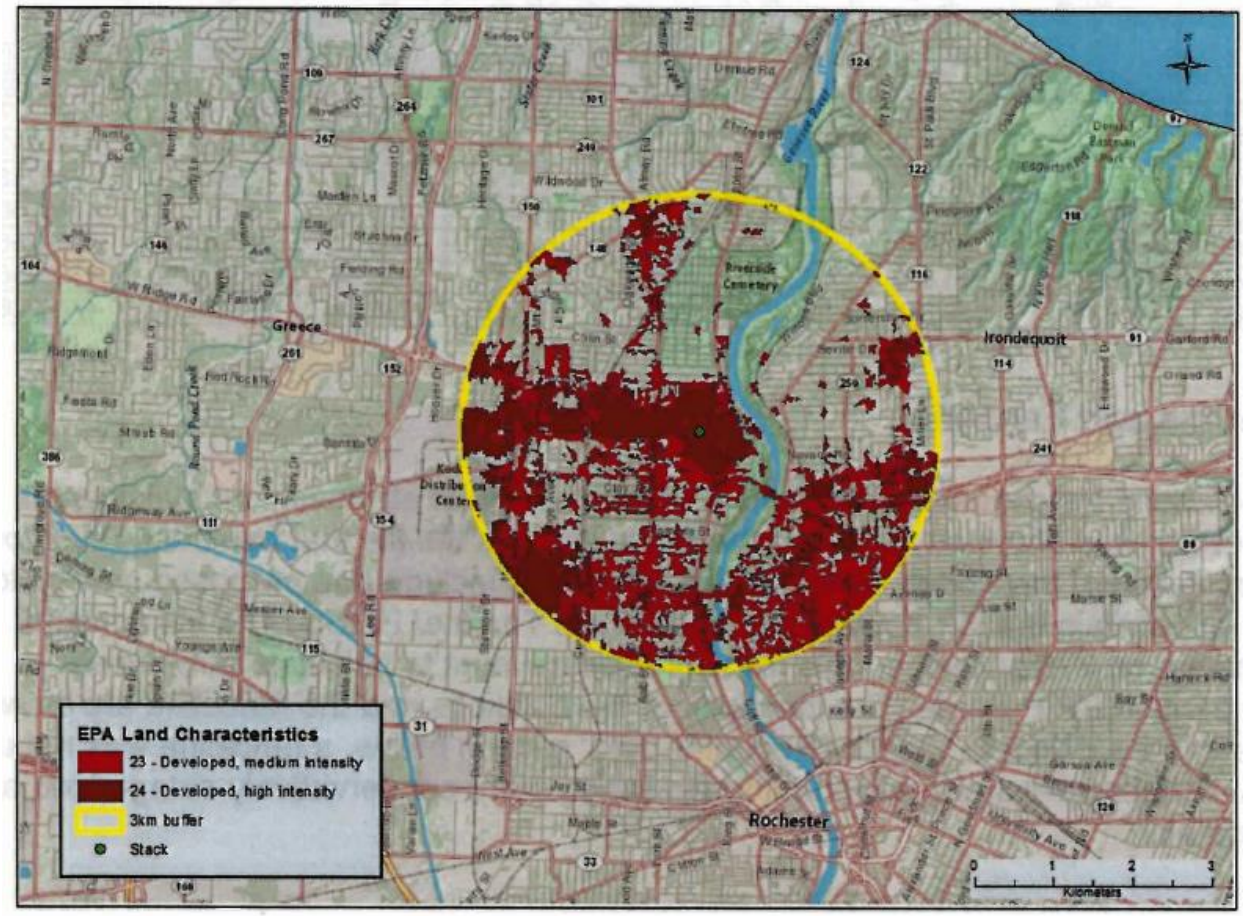
- AERMINUTE: a pre-processor to AERMET incorporating 1-minute automated surface observation system (ASOS) wind data
- AERSURFACE: the surface characteristics processor for AERMET
- AERSCREEN: a screening version of AERMOD

New York used AERMOD version 15181, the most up-to-date version at the time of modeling, using all regulatory default options. AERMOD version 16216r has since become the regulatory model version. There were no updates from 15181 to 16216r that would significantly affect the concentrations predicted in this case. A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

3.3.2.2. Modeling Parameter: Rural or Urban Dispersion

For the purpose of performing the modeling for the area of analysis, New York determined that it was most appropriate to run the model in rural mode. New York came to this conclusion by analyzing the land use within a 3 km radius of the primary source using the 1992 National Land Cover Database (NLCD), which showed that 33.6 percent of the area is in the NLCD's "medium" and "high" development categories. These categories are generally considered equivalent to the urban land use types specified in the Auer scheme which is referenced in the Guideline on Air Quality Models. Since the urban land use within 3 km is under 50 percent, it was determined that AERMOD's urban dispersion algorithms are not appropriate for this location, and the modeling was performed using rural dispersion characteristics.

Figure 2. EPA Multi-Resolution Land Characteristics within 3 km of RED



The land use classification was analyzed consistent with the methodology in the Modeling TAD and the EPA concurs with the assessment.

3.3.2.3. Modeling Parameter: Area of Analysis (Receptor Grid)

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

The source of SO_2 emissions subject to the DRR in this area is described in the introduction to this section. For the Monroe area, New York has included no other emitters of SO_2 within 50 km of RED in any direction. The state determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2

NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. No other sources beyond 50 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis and, therefore, needed to be explicitly modeled. No other DRR sources nearby were identified. There were also no nearby point sources above 1 ton as indicated in the 2014 NEI. However, other sources were accounted for in the background monitor concentration.

New York explicitly modeled the only relevant nearby source, i.e. RED. Other source contributions were accounted for in the measured background monitor data that was added to the modeled concentrations. EPA agrees with New York's approach since it follows EPA's Modeling TAD.

The grid receptor spacing for the area of analysis chosen by New York is as follows:

- 100 m spacing from the primary source to 5 km
- 250 m spacing from 5 km to 10 km from the primary source

The receptor network contained 2,520 receptors capturing the maximum impact. The network covered a comprehensive polar grid extending to 10 km from the primary SO_2 emission source at the facility. The receptors were placed on 36 radials 10 degrees apart.

Figures 3 and 4, included in New York's recommendation, show the State's chosen area of analysis surrounding RED as well as the receptor grid for the area of analysis.

New York placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to each modeled facility, including other facilities' property. New York did not exclude any receptors. The entire facility property area, which was enclosed with fencing, had no receptors excluded.

Figure 3: Area of Analysis for the Monroe County Area

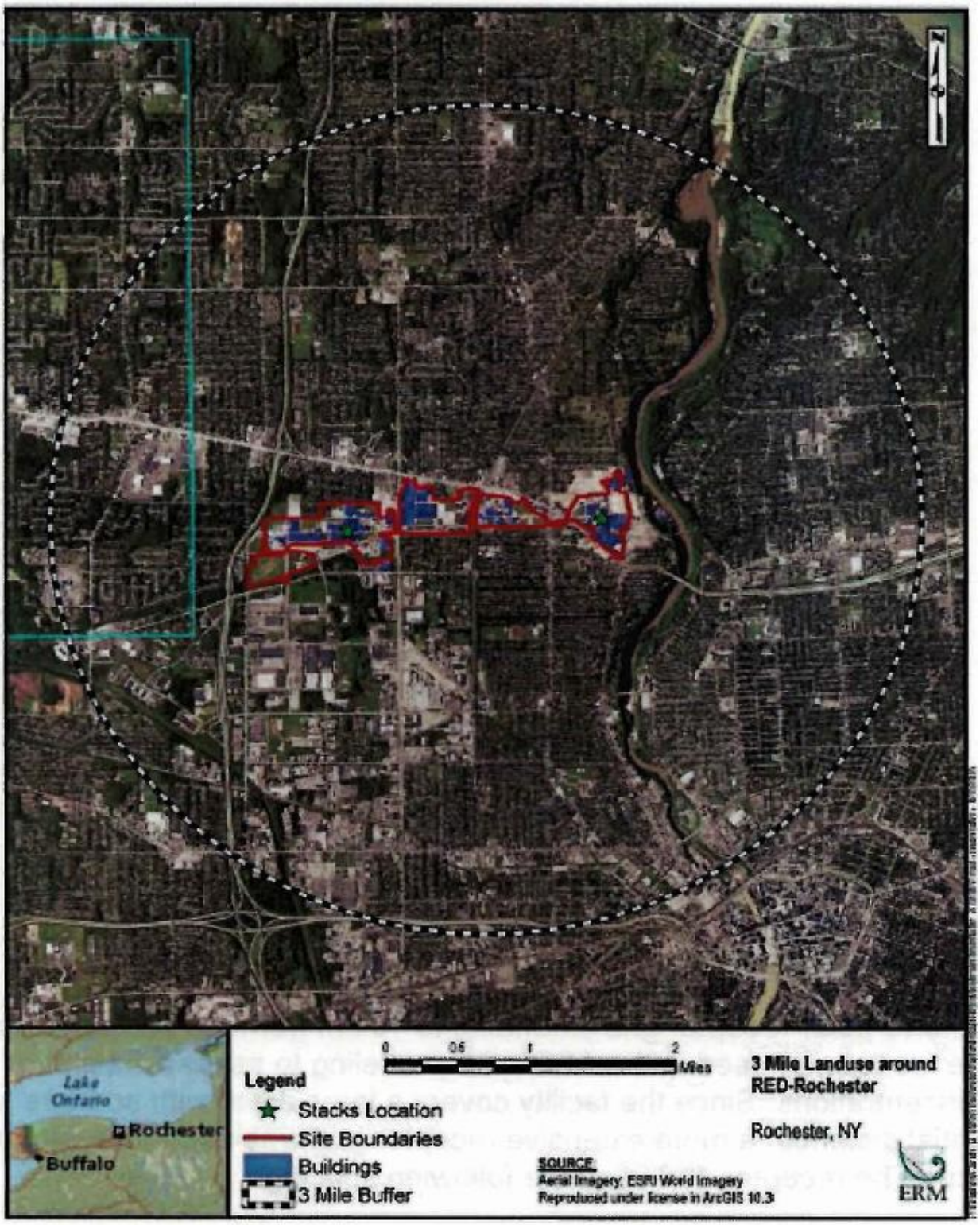
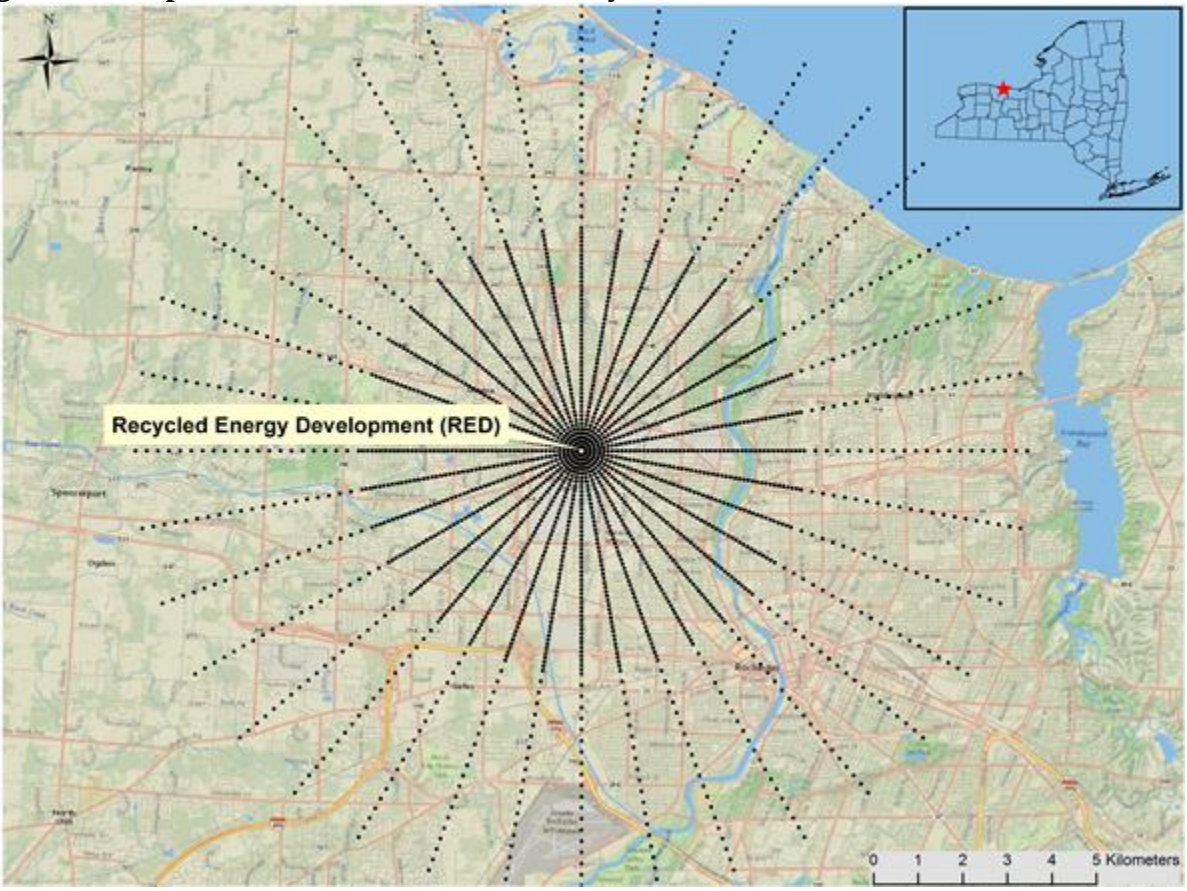


Figure 4: Receptor Grid for the Monroe County Area



The EPA believes that with increasing distance, spatial resolution may diminish while using a polar grid (as opposed to Cartesian). However, the maximum concentration from the facility was close in and was well below the NAAQS. Therefore, we feel that the spatial resolution is acceptable in this case.

3.3.2.4. Modeling Parameter: Source Characterization

RED-Rochester was explicitly included in the modeling of the Monroe area since it is the only source in the area with annual SO_2 emissions exceeding the threshold of 2,000 tons of SO_2 per year. As previously noted, background sources were accounted for in the background monitoring concentration. There were no other point sources above one ton nearby.

New York characterized this source within the area of analysis in accordance with the best practices outlined in the Modeling TAD. At the time, future emissions data obtained from a draft permit (DEC Application No. 8-2699-00126/00001) that was public noticed on October 26, 2016, was modeled. These were the modeled emission based on future conversion from coal to natural gas. Specifically, the State used expected source parameters and expected future emissions data from the proposed permit. New York subsequently issued a final federally enforceable title V permit on July 18, 2017, which included new limits reflecting a natural gas

conversion occurring no later than March 2018.[10] These permitted allowable emission rates were modeled by New York in its analysis for the future emissions scenario.

All sources except for one (00004) were modeled with their actual stack heights since they were below their respective good engineering practices (GEP) heights. Source 00004 was found to be approximately 2 m taller than GEP height; hence GEP height was used in the modeling analysis since this scenario is based on allowable emissions of a future case. New York adequately characterized the source's building layout and location, as well as the stack parameters, e.g., exit temperature, exit velocity, location, and diameter. Where appropriate, the AERMOD component BPIPPRM version 04274 was used to assist in addressing building downwash.

New York's submitted air quality analysis was reviewed by the EPA. The methodologies followed the recommended procedures found in Appendix W of 40 CFR Part 51 (i.e. the Guideline on Air Quality Models). Although the results of the air quality analysis demonstrated that the maximum modeled concentration from RED including background was 79.26 micrograms per cubic meter ($\mu g/m^3$), which is in compliance with the health based 1-hour SO_2 NAAQS of 75 ppb (equivalent to 196.4 $\mu g/m^3$ using a 2.619 conversion factor), the modeling is based on future permit limits that are not yet federally enforceable and effective.

3.3.2.5. Modeling Parameter: Emissions

The EPA's Modeling TAD notes that for the purpose of modeling to characterize air quality for use in designations, the recommended approach is to use the most recent 3 years of actual emissions data and concurrent meteorological data. However, the TAD also indicates that it would be acceptable to use allowable emissions in the form of the most recently permitted (referred to as PTE or allowable) emissions rate that is federally enforceable and effective.

The EPA believes that continuous emissions monitoring systems (CEMS) data provide acceptable historical emissions information, when they are available. These data are available for many electric generating units. In the absence of CEMS data, the EPA's Modeling TAD highly encourages the use of AERMOD's hourly varying emissions keyword HOUREMIS, or through the use of AERMOD's variable emissions factors keyword EMISFACT. When choosing one of these methods, the EPA recommends using detailed throughput, operating schedules, and emissions information from the impacted source(s).

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. For example, where a facility has recently adopted a new federally enforceable emissions limit or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO_2

[10] New York's Final Title V Permit is available at http://www.dec.ny.gov/dardata/boss/afs/permits/826990012600001_r0_1.pdf

emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

As previously noted, New York included RED in the area of analysis. The State had chosen to model this facility using the short term future allowable limit for SO_2 emissions, as discussed in the previous section. The facility included in the State's modeling analysis and its associated PTE rates are summarized below.

For RED, New York provided PTE values. This information is summarized in Table 4. A description of how the State obtained hourly emission rates is given below this table.

Table 4. SO_2 Emissions based on short term PTE from RED in the Monroe Area

Facility Name	SO_2 Emissions (tpy, based on short term PTE)
RED	916
Total Emissions from All Modeled Facilities in the Area of Analysis	916

New York modeled the maximum hourly emission rate from the 7 emission units at RED as if the maximum hourly emission rate occurred simultaneously and continuously throughout the year. The total maximum hourly emission rate from the 7 units is 209 lb/hour (or 916 tons/year.) However, the permit will be limited to the number of hours per year this maximum hourly rate may occur by limiting the annual fuel usage. While the short term maximum PTE is 209 lb/hr, the annual PTE will be equivalent to 916 tons/year.

The PTE in tons per year (tpy) for RED was determined by New York based on a then proposed short term allowable SO_2 emission rate from a proposed permit modification, which includes a fuel switch from coal to natural gas in 2018 (an exact date has yet to be determined.) As mentioned previously the permit limits have since been finalized but the emission limits are not yet effective in the permit terms. The values in Table 4 represent the future short term allowable rate expressed in tpy. The State modeled rates using the future permit conditions for the natural gas scenario (i.e. maximum hourly SO_2 potential emission rate) instead of modeling its past actual hourly conditions using coal.

EPA cannot rely on modeling for designations purposes that includes the use of a future emissions limit that will not be federally effective until after the Round 3 SO_2 designations have been made final.

3.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

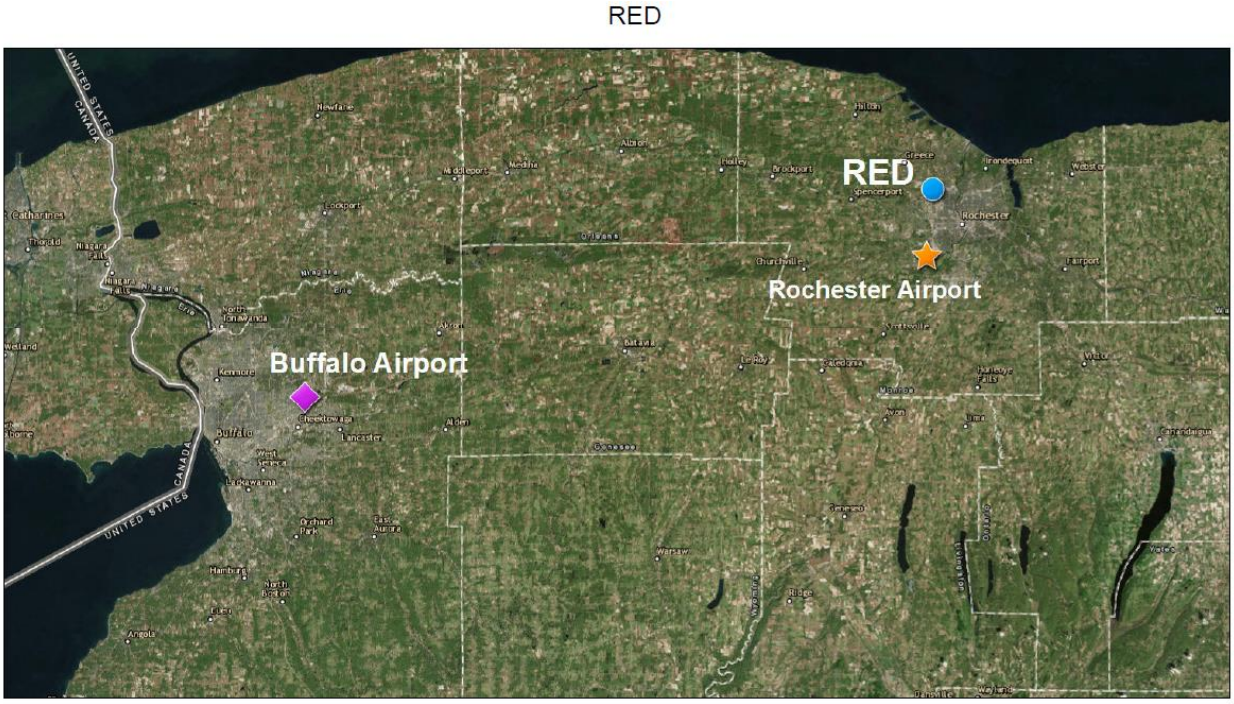
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of the data is determined based on: 1) the proximity of the meteorological monitoring site to the area under consideration, 2) the complexity of terrain, 3) the exposure of the meteorological site, and 4) the period of time during which data are collected. Sources of meteorological data include National Weather Service (NWS) stations, site-specific or onsite data, and other sources such as universities, Federal Aviation Administration (FAA), and military stations.

Since New York used expected source parameters and emission rates based on the draft permit application, the modeling was conducted based on five years of meteorological data – as it would be done for permit modeling. For the area of analysis for the Monroe area, the State selected the surface meteorology from Rochester International Airport (RST), the NWS station in Rochester, New York, located at 43.1172N, 77.6754W, approximately 8 km south of the facility in an area with similar topography. And the State selected concurrent upper air observations from Buffalo Airport (BUF), the NWS station in Buffalo, New York, located at 42.94N, 78.73W, approximately 95 km southwest of the facility, which is the closest upper-air observing site as best representative of meteorological conditions within the area of analysis.

New York used AERSURFACE version 13016 using data from Rochester International Airport to estimate the surface characteristics (albedo, Bowen ratio, and surface roughness [z_o]) of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as "z_o." For this analysis, the 1-km radius circular area centered at the meteorological station site was divided into 12 equal 30-degree sectors for the surface roughness. The Bowen ratio and albedo are based on a 10 x 10 km grid, also centered at the meteorological tower. For the Bowen ratio calculations, AERSURFACE guidance dictates the land use values can be linked to three categories of surface moisture corresponding to average, wet, and dry conditions, depending on the site and meteorological data period. For RST, normal surface moisture is 34.34 inches. The moisture is 99.4%, 107.0%, and 96.0% of normal for 2012, 2013, and 2014, respectively. Hence, the "average" surface moisture option for each month and season that is specified in the AERSURFACE users guide was used since it is representative of the location.

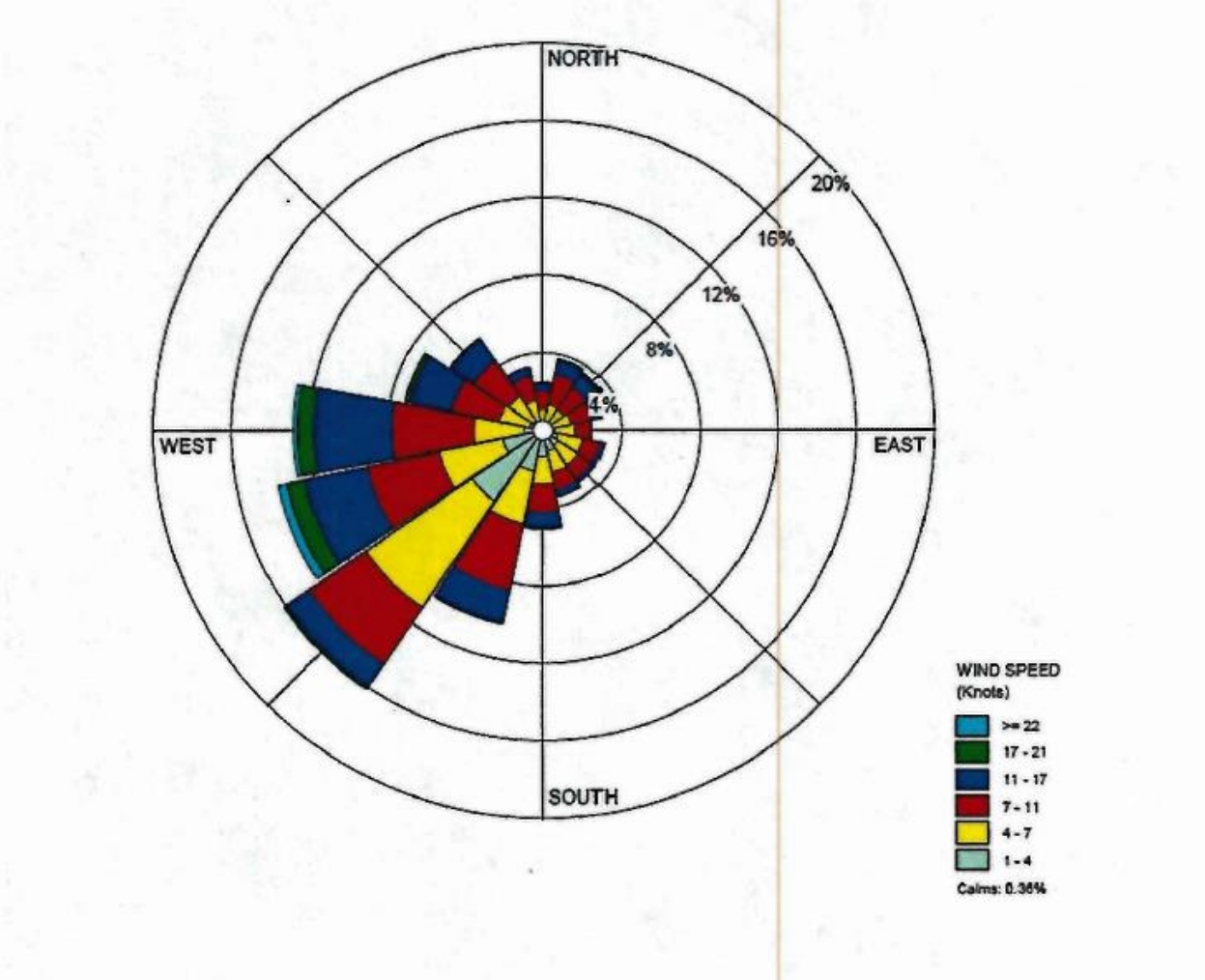
In the figure below, generated by the EPA, the locations of these NWS stations are shown relative to the area of analysis.

Figure 5. Area of Analysis and the NWS stations in the Monroe County Area



As part of its recommendation, the State provided the 5-year surface wind rose for Rochester International Airport. In Figure 6, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The predominant wind direction is from the southwest with calms occurring 0.36 percent of the time. The winds predominately blow from the west to southwest with the lowest wind speeds coming from the southwest. The number of calms are low at 0.36 percent of the total 5-year period between 2011-2015.

Figure 6: Monroe County Area Cumulative Annual Wind Rose for Years 2011 – 2015



Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET version 15181 processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. New York followed the methodology and settings presented in EPA's Guidance on Air Quality Models (40 CFR Appendix W) and NYSDEC's Air Modeling Procedures as outlined in DAR-10/NYSDEC Guidelines on Dispersion Modeling Procedures for Air Quality Impact Analysis, modified by the SO_2 NAAQS Designation Modeling Technical Assistance Document (Modeling TAD), where applicable, in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

Hourly surface meteorological data records are read by AERMET, and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of 1-minute duration was provided from the first-order NWS station, i.e., Rochester International Airport. Minute averages were extracted using the AERMINUTE version 15272 preprocessor and were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data. Using AERMINUTE allows for a better estimate of actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration estimates. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, the State set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the 1-minute wind data.

As per EPA's assessment, New York has accurately applied the methodology to obtain representative meteorological and surface characteristics.

3.3.2.7. Modeling Parameter: Geography, Topography (Mountain Ranges or Other Air Basin Boundaries) and Terrain

The terrain in the area of analysis is best described as fairly flat. To account for these terrain changes, the AERMAP version 11103 terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the USGS National Elevation Database.

The EPA finds the State used the USGS National Elevation Database and AERMAP appropriately to determine the terrain in the area.

3.3.2.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the State chose the tier 1 approach. Hourly SO_2 data from the Rochester Primary 2 monitor site was used to represent background SO_2 levels in the area of RED-Rochester. The site is located on the southeast side of Rochester, AQS ID #360551007, near the I-490/I-590 interchange. The single value of the measured ambient background concentration was determined to be 19.6 ppb, which is equivalent to 51.3 μg/m^3 when expressed in three significant figures[11]. This background value was incorporated into the AERMOD results.

New York's use of the tier 1 approach based on the ambient data's measured design value with the nearest representative monitoring station is deemed appropriate by the EPA. The monitoring data is added to the modeled impact to determine the total concentration.

[11] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in μg/m^3. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 μg/m^3.

3.3.2.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Monroe County area of analysis are summarized below in Table 5.

Table 5: Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Monroe Area

Input Parameter	Value
AERMOD Version	15181 (regulatory options)
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	7
Modeled Structures	275
Modeled Fencelines	0
Total receptors	2,520
Emissions Type	Proposed Allowable
Emissions Years	Anticipated 2018
Meteorology Years	2011-2015
NWS Station for Surface Meteorology	Rochester International Airport (RST)
NWS Station Upper Air Meteorology	Buffalo Airport (BUF)
NWS Station for Calculating Surface Characteristics	Rochester International Airport (RST)
Methodology for Calculating Background SO_2 Concentration	Hourly SO_2 data from AQS ID 360551007 (Rochester) site. Tier 1 based on 2012-2014 design value.
Calculated Background SO_2 Concentration	19.6 ppb or 51.3 $\mu g/m^3$

The results presented below in Table 6 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

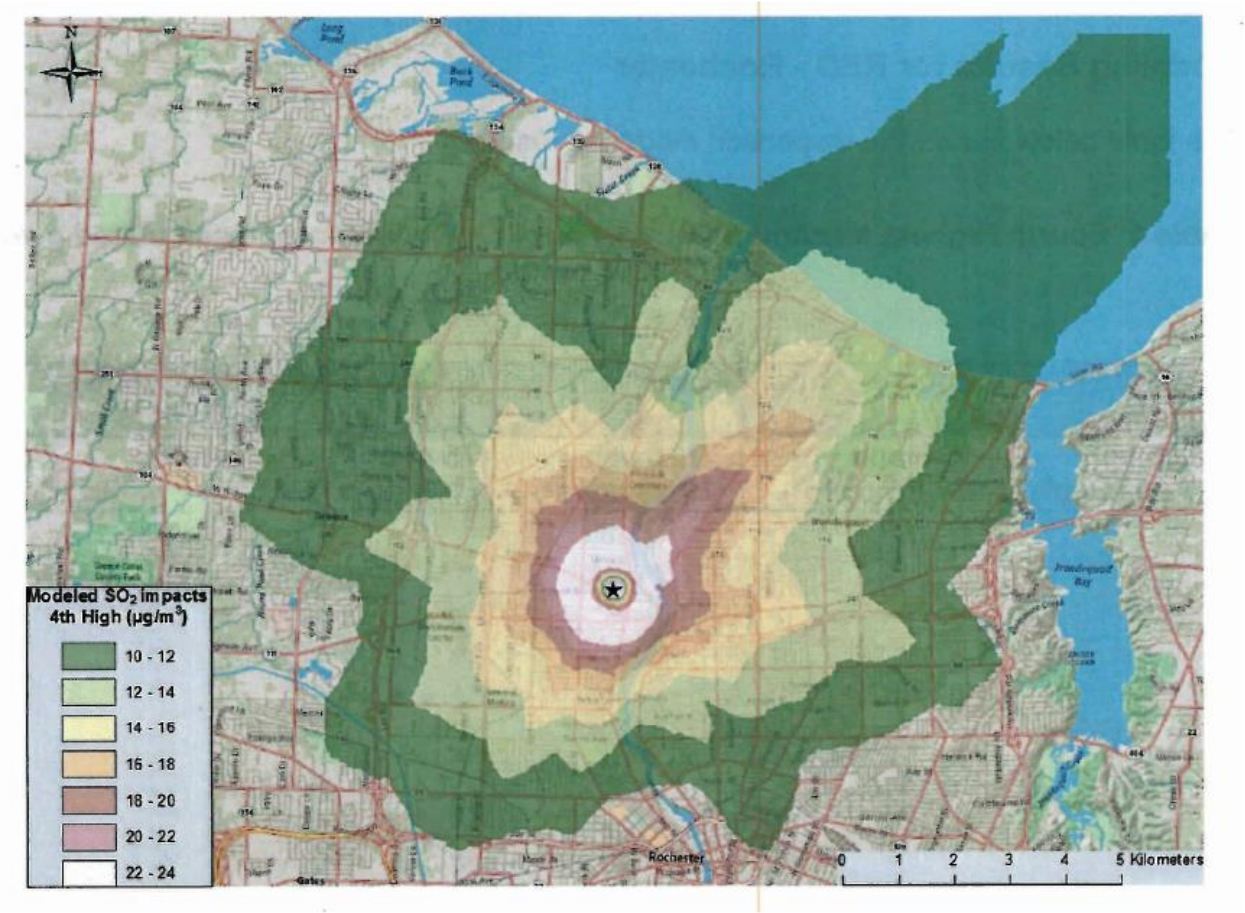
Table 6. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over Five Years for the Area of Analysis for the Monroe County Area

Averaging Period	Data Period	Receptor Location [UTM zone 18N]		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM Easting	UTM Northing	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2011-2015	286400.85 m	4786890.86 m	79.26	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 $\mu g/m^3$ conversion factor

New York's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 79.26 $\mu g/m^3$, equivalent to 30.26 ppb. This modeled concentration included the background concentration of SO_2, but is based on allowable emissions from the facility that will become federally enforceable and effective no later than March 2018 according to the permit terms. Figure 7 below was included as part of the state's recommendation, and indicates that the predicted value occurred just north of the northeast corner of the facility property, approximately 600 meters from the largest emitting unit at the facility. Table 6 includes the total concentration (modeled + background). Figure 7 is a visual depiction of the modeled concentrations only.

Figure 7: Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Five Years for the Area of Analysis for the Monroe County Area



The modeling submitted by New York indicates the 1-hour SO_2 NAAQS is attained at all receptors based on not yet federally enforceable and effective emission limits, that will be federally enforceable and effective no later than March 2018.

3.3.2.10. The EPA's Assessment of the Modeling Information Provided by the State

The analysis followed the appropriate methods outlined in its protocol. The modeling techniques followed the EPA's modeling guidelines. There were no beta options used such as the adjusted u* adjustment.

As previously mentioned, New York's modeling was based on future permit limits that are not yet federally enforceable and effective emission limits (they will be by March 2018, but an exact date has yet to be determined.) As such, the modeling submitted by the State does not inform the characterization of current air quality for the Monroe area, but informs the status of the air quality at the time of RED's future operating scenario.

3.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Monroe County Area

These factors have been incorporated into the air quality modeling efforts and results discussed above. The EPA is giving consideration to these factors by considering whether they were properly incorporated and by considering the air quality concentrations predicted by the modeling.

3.5. Jurisdictional Boundaries in the Monroe County Area

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for Monroe County, New York. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

New York recommended that the EPA designate the entirety of Monroe County as attainment. New York referenced EPA's March 20, 2015 guidance that indicated county boundaries may be appropriate for defining attainment areas in the absence of any other information that would help define a more specific boundary around the SO_2 source in question. The boundaries of Monroe County are well established and well known.

3.6. Other Information Relevant to the Designations for the Monroe County Area

The EPA has received no third party modeling for this area. The EPA does not have any other relevant information.

3.7. The EPA's Assessment of the Available Information for the Monroe County, New York Area

The EPA cannot determine based on all available information whether the area, which is required to be characterized under the DRR, is meeting or not meeting the 2010 SO_2 NAAQS, and cannot determine whether the Monroe County area contributes to a violation in a nearby area. Currently available air monitoring data, although well below the NAAQS and trending downward, is insufficient to support a conclusion that there is no NAAQS violation in any portion of the State. The Monroe County air monitor is not sited to characterize the maximum 1-hr SO_2 concentrations near the RED facility. Additionally, New York's air modeling was based on future permit limits that have not yet been implemented and are not currently federally enforceable and effective. As such, the modeling submitted by the State does not inform the characterization of current air quality for the Monroe County area, nor inform whether the area contributes to ambient air quality in a nearby area that does not meet the NAAQS.
.

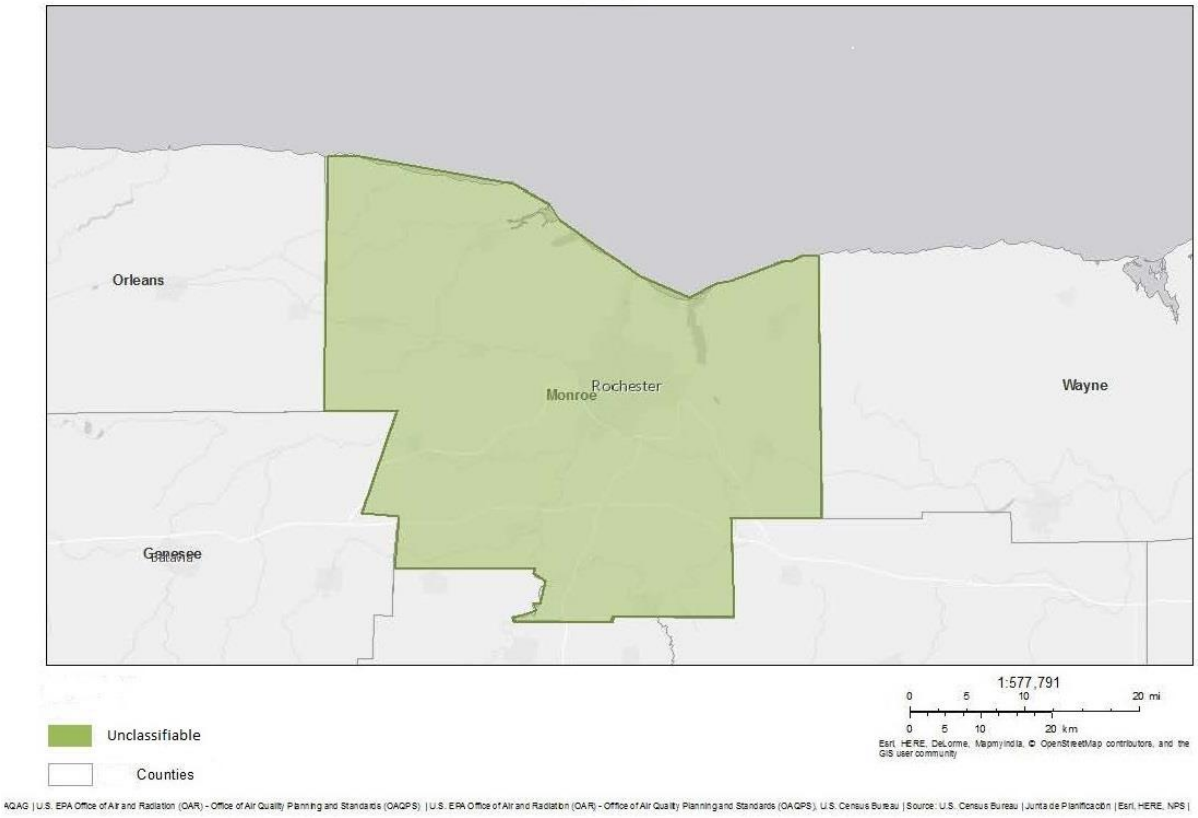
The EPA believes that our intended unclassifiable area, bounded by the borders of the county of Monroe, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable area.

3.8. Summary of Our Intended Designation for the Monroe County, New York Area

After careful evaluation of New York's recommendation and supporting information, as well as all available relevant information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA intends to designate the Monroe County area as unclassifiable for the 2010 SO_2 NAAQS because it cannot be determined if the area is attaining the standard and not contributing to ambient air quality in a nearby area that does not meet the NAAQS. Specifically, the boundaries are comprised of the borders of Monroe County.

Figure 8 shows the boundary of this intended designated area.

Figure 8. Boundary of the Intended Monroe County Unclassifiable Area



At this time, our intended designations for New York only apply to this area and the other areas presented in this technical support document. The EPA intends in a separate action to evaluate and designate all remaining undesignated areas in New York by December 31, 2020.

4. Technical Analysis for the Albany County Area

4.1. Introduction

The EPA must designate the Albany County area by December 31, 2017, because the area has not been previously designated and New York has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of any source in Albany County.

4.2. Air Quality Monitoring Data for the Albany County Area

This factor considers the SO_2 air quality monitoring data in the area of Albany County. New York included monitoring data from the following monitor:

- Air Quality System monitor (AQS ID 36-001-0012). This monitor is located at 300 Albany Shaker Road, in Loudonville, New York, and is approximately 4 km north of the City of Albany, and approximately 20 km north of the Lafarge North America-Ravena facility. Data collected at this monitor indicates a 2013-2015 design value of 8 ppb and a 2014-2016 design value of 6 ppb. However, this monitor was not sited to characterize the maximum 1-hour SO2 concentration near the Lafarge North America-Ravena facility. New York provided an air quality modeling analysis to characterize the area (see the air quality modeling section immediately below.) The EPA has confirmed that there are no additional relevant data in AQS that could inform the intended designation action.

New York emphasized the Loudonville monitor's design value as one of the factors for a state designation recommendation of attainment. The state used the data from the Loudonville monitor to determine background concentrations for the air dispersion modeling; the discussion of the modeling follows immediately below.

Table 7. SO_2 Design Monitor Design Values – Albany County Area

Monitor	AQS ID	County, State	Distance from Lafarge (km)	Direction from Lafarge	2011-2013 SO_2 Design Value (ppb)	2012-2014 SO_2 Design Value (ppb)	2013-2015 SO_2 Design Value (ppb)	2014-2016 SO_2 Design Value (ppb)
Loudonville	360010012	Albany, NY	20	N	11	8	8	6

Data collected indicates SO_2 concentrations well below the NAAQS, and trending downward. The monitor is located in suburban Albany, and is in relatively close proximity (5-10 km) to other smaller SO_2 sources (i.e. less than 125 tons) in the county. New York did not provide any information that the monitor is located in the maximum impact area for the other SO_2 sources in the county.

4.3. Air Quality Modeling Analysis for the Albany County Area Addressing Lafarge North America - Ravena

4.3.1. Introduction

This section presents all the available air quality modeling information for a portion of Albany that includes Lafarge North America - Ravena. (This portion of Albany will often be referred to as "the Albany County area" within this section). This area contains the following SO_2 source, principally the sources around which New York is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- The Lafarge North America - Ravena facility emits 2,000 tons or more annually. Specifically, Lafarge emitted 4,582 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and New York has chosen to characterize it via modeling.

In its submission, New York recommended that an area that includes the area surrounding the Facility, specifically the entirety of Albany County be designated as attainment based in part on an assessment and characterization of air quality impacts from this facility. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing allowable emissions. After careful review of the State's assessment, supporting documentation, and all available data, the EPA intends to designate the area as unclassifiable/attainment. Our reasoning for this conclusion is explained in a later section of this TSD, after all the available information is presented.

The area that New York has assessed via air quality modeling is located in the town of Coeymans, New York.

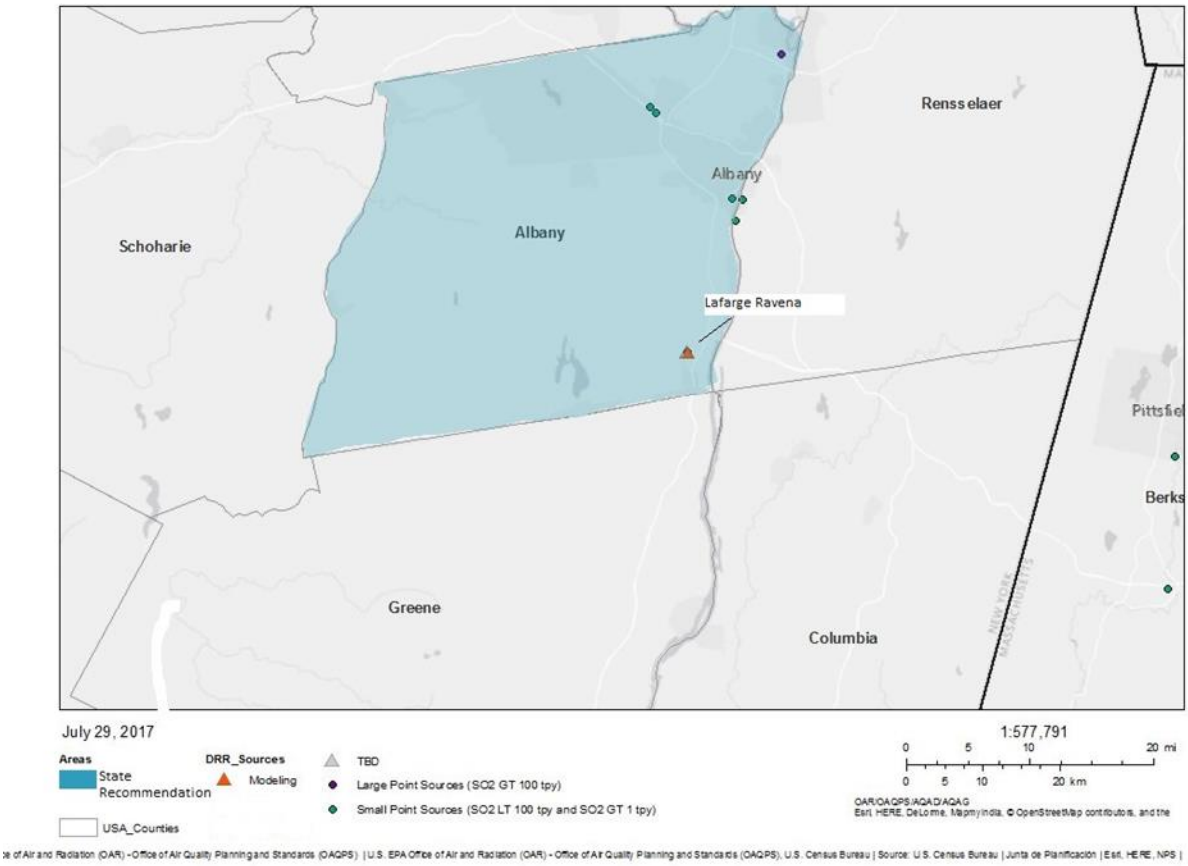
As seen in Figure 9 below, the Lafarge facility is located in the southeastern portion of Albany County, approximately 18 km south of Albany, New York. Lafarge is located on US Route 9W; Lafarge owns approximately 3,274 contiguous acres east and west of US Route 9W. The site includes the quarry, the cement plant, the conveying system from the plant to the docking and loading facilities on the Hudson River, and a piece of land is leased to Callanan Industries for its aggregate operation.

As shown in figure 9 below there are several other point sources in Albany County; though none are near Lafarge. The nearest are three small point sources near the city of Albany, emitting less

than 5 tons each. A moderately size source, the Norelite Corporation, emitted approximately 120 tons in 2014, is located in the northeastern portion of Albany County. Norelite is approximately 30 kilometers north of Lafarge.

Also included in the figure is the area that New York recommends for attainment for the designation, i.e., the entirety of Albany County. The designation boundary is shown in a figure in the section below that summarizes our intended designation.

Figure 9. Map of the Albany County, New York Area Addressing Lafarge



The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA's July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

For this area, the EPA received and considered the modeling assessment from New York. The EPA has not conducted its own modeling of this area, and the EPA has not received modeling of this area from any other parties.

4.3.1.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

- AERMOD: the dispersion model
- AERMAP: the terrain processor for AERMOD
- AERMET: the meteorological data processor for AERMOD
- BPIPPRM: the building input processor
- AERMINUTE: a pre-processor to AERMET incorporating 1-minute automated surface observation system (ASOS) wind data
- AERSURFACE: the surface characteristics processor for AERMET
- AERSCREEN: a screening version of AERMOD

New York used AERMOD version 15181, the most up-to-date version at the time of modeling, using all regulatory default options. AERMOD version 16216r has since become the regulatory model version. There were no updates from 15181 to 16216r that would significantly affect the concentrations predicted in this case. A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

4.3.1.2. Modeling Parameter: Rural or Urban Dispersion

For the purpose of performing the modeling for the area of analysis, New York determined that it was most appropriate to run the model in rural mode. The state came to this conclusion by using the Auer technique and examining the land use within 3 km of the facility using the 1992 National Land Cover Database (NLCD). Figure 10 shows that the area is predominantly vegetated land with very little other land use categories. Therefore, using the Auer technique, the area would be considered rural and the use of AERMOD's rural dispersion characteristics is appropriate in this case.

The land use classification was analyzed consistent with the methodology in the Modeling TAD and the EPA concurs with the assessment.

4.3.1.3. Modeling Parameter: Area of Analysis (Receptor Grid)

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

The source of SO_2 emissions subject to the DRR in this area is described in the introduction to this section. For the Albany area, New York has included no other emitters of SO_2 within 50 km of Lafarge in any direction. The state determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. No other sources beyond 50 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis. No other DRR sources nearby were identified. As mentioned previously there are several small point sources in Albany County. However, the background sources were accounted for in the background monitoring concentration.

New York explicitly modeled the only relevant nearby source, i.e. Lafarge. Other source contributions were accounted for in the measured background monitor data that was added to the modeled concentrations. EPA agrees with New York's approach since it follows EPA's modeling TAD.

The grid receptor spacing for the area of analysis chosen by New York is as follows:

- 100 m spacing extending from the source to 3 km
- 250 m spacing extending from 3 km to 7 km
- 500 m spacing extending from 7 km to 15 km

The receptor network contained 2,484 receptors capturing the maximum impact. The network covered a comprehensive polar grid extending to 15 km from the facility. The receptors were placed on 36 radials 10 degrees apart and the grid was centered on the new kiln, emission source EP23.

There were no receptors inside the fenceline area (fenced portion of facility property), shown in green in Figure 10, of the facility. The polar receptor grid at 36 radials 10 degrees apart is sufficiently refined to determine fenceline concentrations. Figures 10 and 11, which were provided in New York's recommendation, show the State's chosen area of analysis surrounding Lafarge-Ravena, as well as the receptor grid for the area of analysis.

Consistent with the Modeling TAD, the State placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to each modeled facility. New York did not exclude receptors on any other property in the modeling domain, except for within the Lafarge-Ravena facility fenceline.

Figure 10: Area of Analysis for the Albany County Area

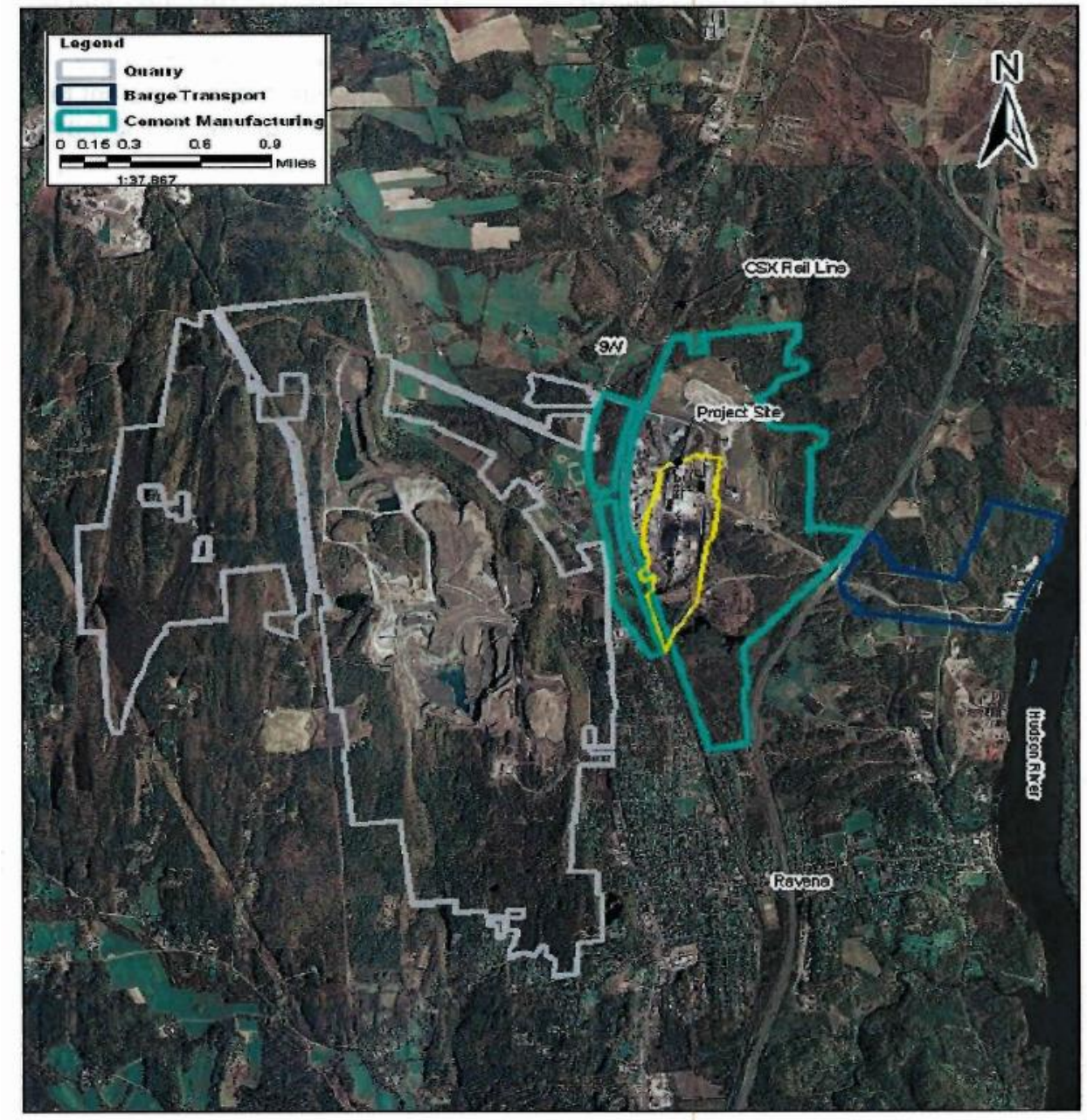
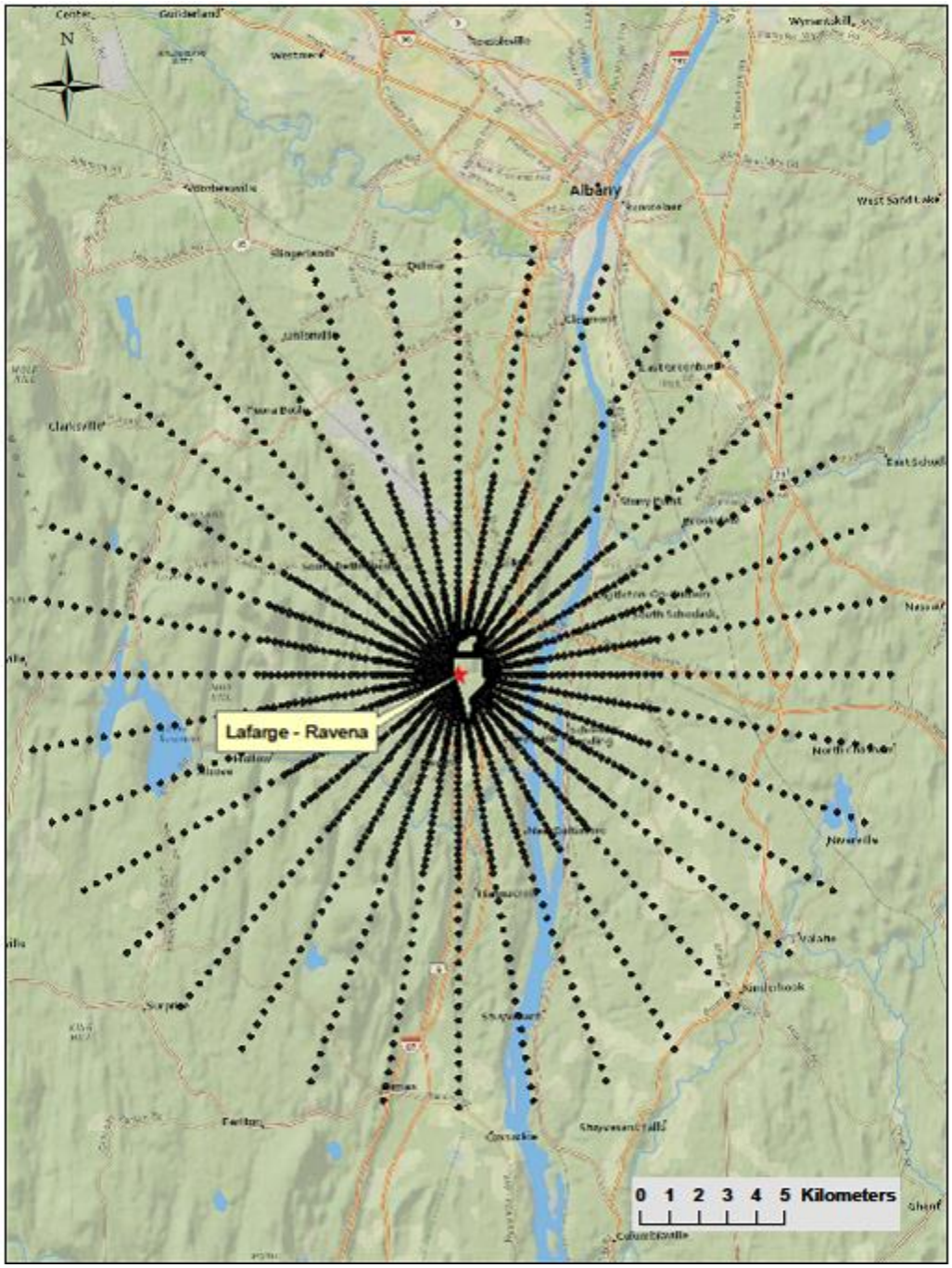


Figure 11: Receptor Grid for the Albany County Area



The EPA believes that with increasing distance, spatial resolution may diminish while using a polar grid (as opposed to Cartesian. However, the maximum concentration from the facility was close in and was well below the NAAQS. Therefore, the spatial resolution is acceptable in this case.

4.3.1.4. Modeling Parameter: Source Characterization

Lafarge was explicitly included in the modeling of the Albany area since it is the only source in the area with annual SO_2 emissions exceeding the threshold of 2,000 tons of SO_2 per year. EPA does not believe there are any sources that would have caused a concentration gradient that would not have been accounted for by the ambient background monitor (see Section 4.3.1.8).

New York characterized this source within the area of analysis in accordance with the best practices outlined in the Modeling TAD. Specifically, the State followed the EPA's good engineering practices (GEP) policy in conjunction with allowable emissions limits. The State also adequately characterized the source's building layout and location, as well as the stack parameters, e.g., exit temperature, exit velocity, location, and diameter. Where appropriate, the AERMOD component BPIPPRM version 04274 was used to assist in addressing building downwash.

The EPA reviewed the modeling submitted in the state's January 4, 2017, submission based on future allowable emissions from Lafarge since the facility was undergoing a modification. At the time of the January 2017 submission the "old" kiln had been taken out of service to comply with a Consent Decree[12] requiring the retirement of the existing kiln by June 30, 2016. New York modeled using the existing Title V permit[13] conditions for the replacement kiln which was not yet in operation, but was expected to be in operation in 2017. EPA notes that the replacement kiln has been subsequently constructed, and begun operation in the Spring of 2017.

The Lafarge facility was the primary source. There were no other DRR source nearby. Other SO_2 source contribution were accounted for by adding in the measured ambient concentrations. EPA found the analyses conformed with the Guideline on Air Quality Models and the TAD. The air quality analysis demonstrated that the maximum modeled concentration from Lafarge including background was 84.93 µg/m^3, which is in compliance with the 1-hour SO_2 NAAQS of 75 ppb (or 196.4 µg/m^3).

4.3.1.5. Modeling Parameter: Emissions

The EPA's Modeling TAD notes that for the purpose of modeling to characterize air quality for use in designations, the recommended approach is to use the most recent 3 years of actual emissions data and concurrent meteorological data. However, the TAD also indicates that it would be acceptable to use allowable emissions in the form of the most recently permitted (referred to as PTE or allowable) emissions rate that is federally enforceable and effective.

In certain instances, such as in this case with Lafarge, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. For example, where a facility has recently adopted a new federally enforceable emissions limit or

[12] "Old" kiln retired by 6/30/16 per paragraph B.6 of Consent Decree (Civil action No 3:10-cv-44, Third Amendment, filed 7/23/13).

[13] NY Permit #4-0124-00001/00112: Item 12-71.2 limit for new kiln is 0.4 pounds of SO2/ton of clinker. The clinker limit of 2,810,000 tons per year is listed under 231-8, in MOD 12 of REN 1; condition 12-17. See http://www.dec.ny.gov/dardata/boss/afs/permits/401240000100112_r1_20.pdf

implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

As previously noted, New York included Lafarge in the area of analysis. The State has chosen to model this facility using the most recent federally enforceable PTE limits for SO_2 emissions. The facility included in the State's modeling analysis and its associated PTE rates are summarized below.

For Lafarge, New York provided PTE values. This information is summarized in Table 8. A description of how the State obtained hourly emission rates is given below this table.

Table 8. SO_2 Emissions based on PTE from Facility in the Albany Area

Facility Name	SO_2 Emissions (tpy, based on short term PTE)
Lafarge	613
Total Emissions from All Modeled Facilities in the Area of Analysis	613

The PTE, in tons per year, for Lafarge was determined by New York based on a modification for the facility where the "old" kiln has been removed and is no longer operational to comply with a Consent Decree, which required retirement of the existing kiln by June 30, 2016. The "replacement" kiln began operation in Spring 2017. The State modeled the facility using these federally enforceable and effective permit conditions[14] (i.e. maximum hourly SO_2 potential emission rate), since its past actual hourly emissions are no longer representative of current conditions in the area.

[14] NY Permit #4-0124-00001/00112: Item 12-71.2 limit for new kiln is 0.4 pounds of SO_2/ton of clinker. The clinker limit of 2,810,000 tons per year is listed under 231-8, in MOD 12 of REN 1; condition 12-17 "Old" kiln retired by 6/30/16 per paragraph B.6 of Consent Decree (Civil action No 3:10-cv-44, Third Amendment, filed 7/23/13). New kiln construction completed in Spring 2017.

4.3.1.6. Modeling Parameter: Meteorology and Surface Characteristics

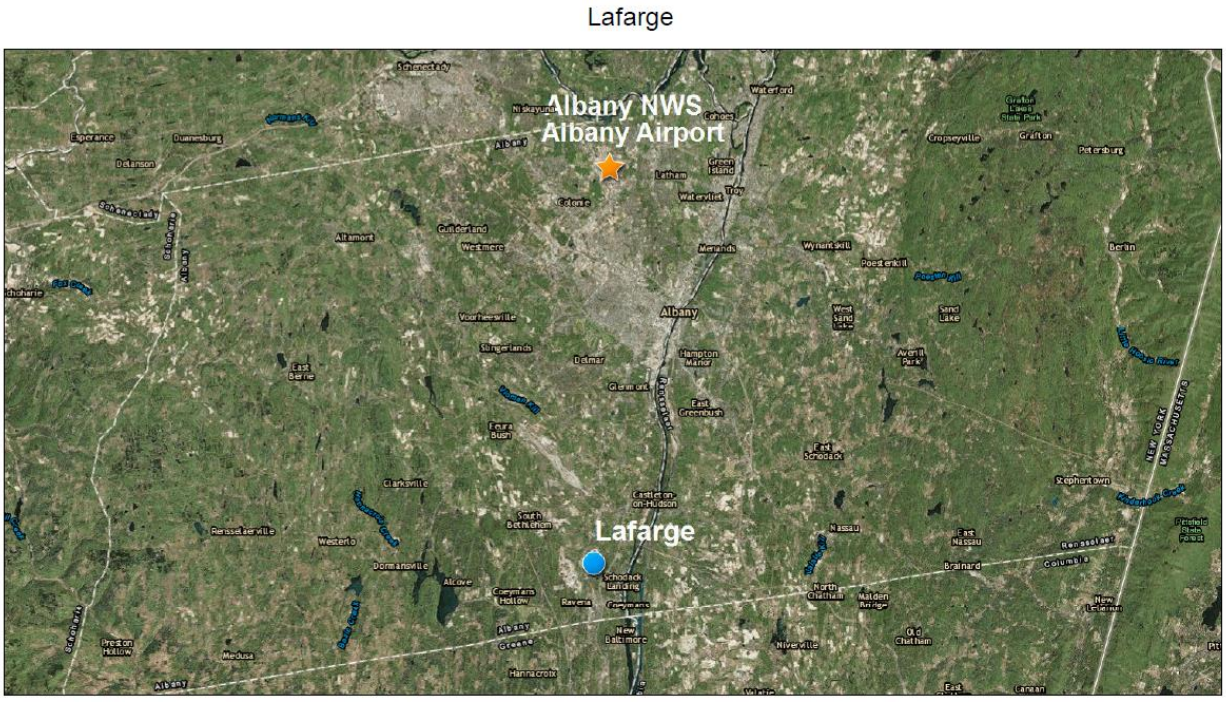
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of the data is determined based on: 1) the proximity of the meteorological monitoring site to the area under consideration, 2) the complexity of terrain, 3) the exposure of the meteorological site, and 4) the period of time during which data are collected. Sources of meteorological data include National Weather Service (NWS) stations, site-specific or onsite data, and other sources such as universities, Federal Aviation Administration (FAA), and military stations.

New York used source parameters and emission rates reflective of the Lafarge-Ravena permit. The modeling was conducted based on five years of meteorological data – as it would be done for permit modeling. For the area of analysis for the Albany County area, the State selected the surface meteorology from Albany International Airport (ALB), the NWS station in Colonie, New York, located at 42.747N, 73.799W, 29 km north of the facility, and coincident upper air observations from Albany National Weather Service office located at 42.748N, 73.803W, as best representative of meteorological conditions within the area of analysis.

New York used AERSURFACE version 13016 using data from Albany International Airport to estimate the surface characteristics (albedo, Bowen ratio, and surface roughness [z_o]) of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as "z_o." For this analysis, the 1 km radius circular area centered at the meteorological station site was divided into 12 equal 30 degree sectors for the surface roughness. The Bowen ratio and albedo are based on a 10 x 10 km grid, also centered at the meteorological tower. For the Bowen ratio calculations, AERSURFACE guidance dictates the land use values can be linked to three categories of surface moisture corresponding to average, wet, and dry conditions, depending on the site and meteorological data period. For ALB, normal surface moisture is 39.35 inches. The moisture is 94.0%, 111.4%, and 100.9% of normal for 2012, 2013, and 2014, respectively. Hence, the "average" surface moisture option for each month and season that is specified in the AERSURFACE users guide was used since it is representative of the location.

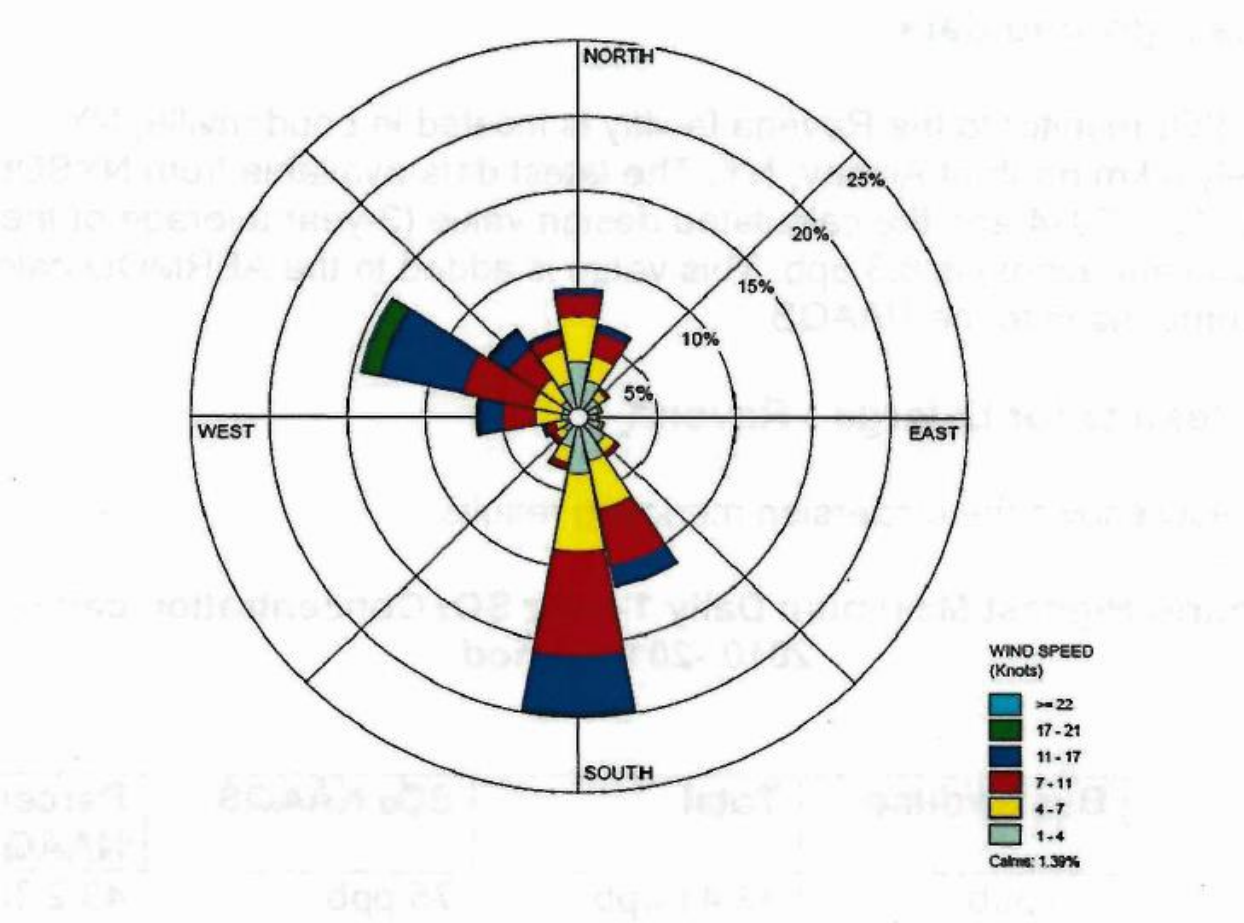
In the figure below, generated by the EPA, the location of this NWS station is shown relative to the area of analysis.

Figure 12. Area of Analysis and the NWS station in the Albany County Area



As part of its 2017 recommendation, New York provided the 5-year surface wind rose for Albany International Airport. In Figure 13, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Southerly winds predominate, partly due to the terrain effects of the Hudson Valley, with west-northwesterly winds also occurring frequently. Calms occurred 1.39 percent of the time.

Figure 13: Albany, NY Cumulative Annual Wind Rose for Years 2011 – 2015



Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET version 15181 processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. New York followed the methodology and settings presented in the EPA's Guidance on Air Quality Models (40 CFR Appendix W) and NYSDEC's Air Modeling Procedures as outlined in DAR-10 / NYSDEC Guidelines on Dispersion Modeling Procedures for Air Quality Impact Analysis, modified by the SO_2 NAAQS Designation Modeling Technical Assistance Document (Modeling TAD), where applicable, in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

Hourly surface meteorological data records are read by AERMET, and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of 1-minute duration was provided from the first-order NWS station mentioned above, but in a different formatted file to be processed by a separate preprocessor, AERMINUTE version 15272 . These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration estimates. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, the State set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the 1-minute wind data.

The EPA agrees that the meteorological data is appropriate in this case because it is representative of the area and meets the criteria specified in Section 7.2 of the SO_2 Modeling TAD. The EPA also agrees that the data was appropriately preprocessed using AERMINUTE, AERSURFACE, and AERMET. The wind rose in Figure 13 illustrates the predominate wind features of the Albany area.

4.3.1.7. Modeling Parameter: Geography, Topography (Mountain Ranges or Other Air Basin Boundaries) and Terrain

The terrain in the area of analysis is best described as complex to gently rolling. To account for these terrain changes, the AERMAP version 11103 terrain program within AERMOD modeling system was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the USGS National Elevation Database.

The EPA agrees the AERMAP preprocessor was appropriately applied by New York in this case in order to simulate the surrounding terrain.

4.3.1.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, New York chose the tier 1 approach. The closest SO_2 monitor to the Lafarge facility is located in Loudonville, New York, AQS ID #36-001-0012, approximately 4 km north of Albany. The latest available data are for the period 2012-2014. The single value of the background concentration for this area of analysis was determined by the State to be 21.75 micrograms per cubic meter ($\mu g/m^3$), equivalent to 8.3 ppb when expressed in 2 significant figures,[15] and that value was incorporated into the final AERMOD results.

The EPA agrees with New York's approach of including background concentration in the air quality analysis of the 1-hour SO_2 NAAQS (i.e., the use of the design value measured at the Loudonville ambient monitor). The ambient monitor is representative of the contribution of background sources in the Albany County area because it is only 4 km away from the source and measures contributions from other sources in the area.

[15] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in $\mu g/m^3$. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 $\mu g/m^3$.

4.3.1.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Albany County area of analysis are summarized below in Table 9.

Table 9: Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Albany County Area

Input Parameter	Value
AERMOD Version	15181 (regulatory options)
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	2
Modeled Structures	44
Modeled Fencelines	1
Total receptors	2,484
Emissions Type	PTE
Emissions Years	Effective date of facility permit (mod 20) was 12/09/2014[16]
Meteorology Years	2011-2015
NWS Station for Surface Meteorology	Albany International Airport (ALB)
NWS Station Upper Air Meteorology	Albany National Weather Service Office
NWS Station for Calculating Surface Characteristics	Albany International Airport (ALB)
Methodology for Calculating Background SO_2 Concentration	SO_2 data from Loudonville, NY site (AQS ID #36-001-0012) Tier 1 based on 2012-2014 design value.
Calculated Background SO_2 Concentration	8.3 ppb or 21.75 µg/m^3

The results presented below in Table 10 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

[16] NY Permit #4-0124-00001/00112: Item 12-71.2 limit for new kiln is 0.4 pounds of SO_2/ton of clinker. The clinker limit of 2,810,000 tons per year is listed under 231-8, in MOD 12 of REN 1; condition 12-17 "Old" kiln retired by 6/30/16 per paragraph B.6 of Consent Decree (Civil action No 3:10-cv-44, Third Amendment, filed 7/23/13). New kiln construction completed in Spring 2017.

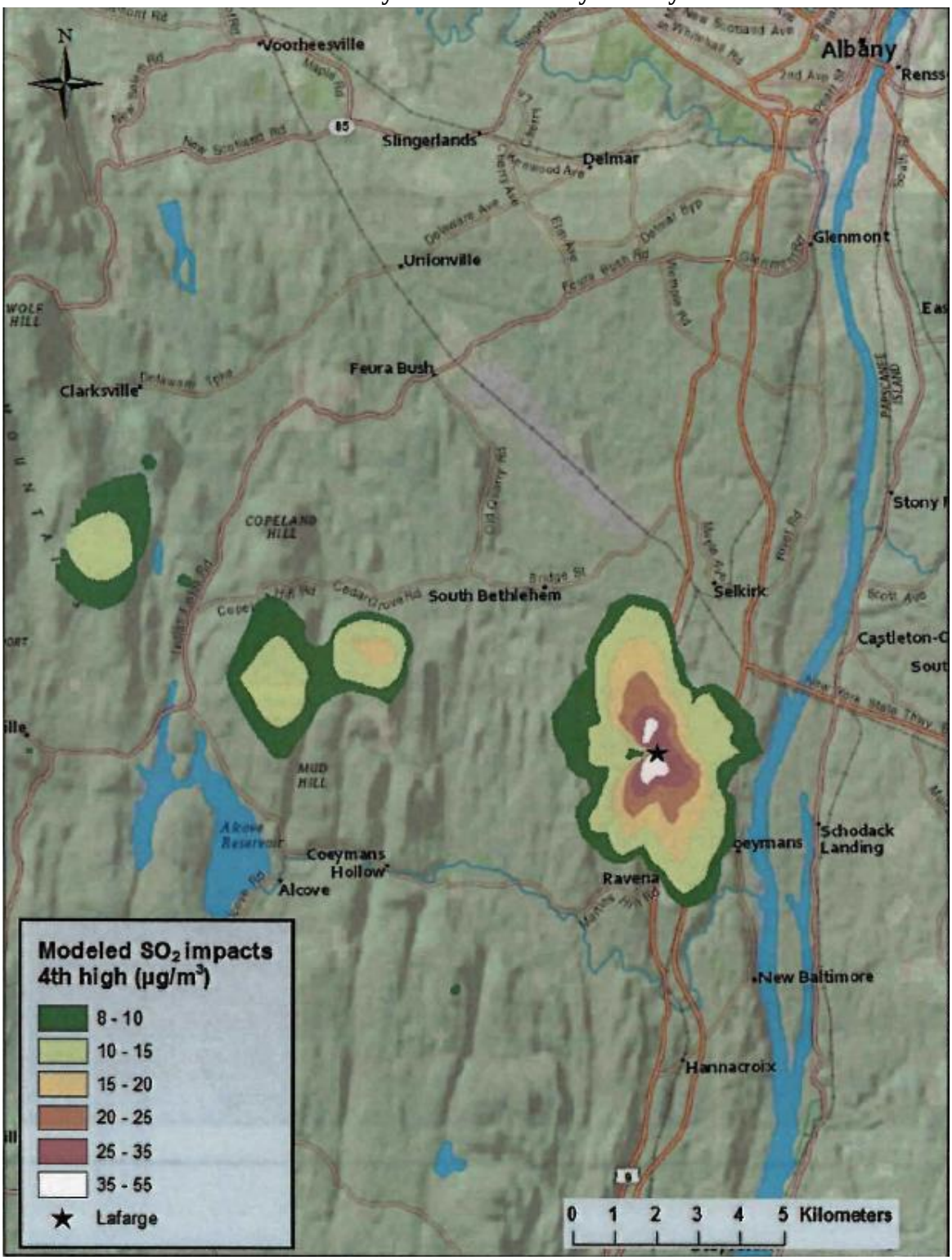
Table 10. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over Five Years for the Area of Analysis for the Albany County Area

Averaging Period	Data Period	Receptor Location [UTM zone 18N]		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM Easting	UTM Northing	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2011-2015	597181.20 m	4705237.60 m	84.93	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 $\mu g/m^3$ conversion factor

New York's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 84.93 $\mu g/m^3$, equivalent to 32.43 ppb. This modeled concentration included the background concentration of SO_2, and is based on PTE emissions from the facility. Figure 14 below was included as part of the State's recommendation, and indicates that the predicted value occurred just west of the facility property.

Figure 14: Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Five Years for the Area of Analysis for the Albany County Area



The modeling submitted by New York does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration.

4.3.1.10. The EPA's Assessment of the Modeling Information Provided by the State

Based on the information provided by New York and summarized in Section 4.3, the EPA concludes that the State adequately examined and characterized sources within the area of analysis and appropriately placed receptors in the modeling domain; appropriately initialized and accounted for modeled emission sources and building downwash; correctly selected meteorological sites and properly processed the data; adequately estimated surface characteristics; and appropriately calculated background concentrations of SO_2 to add to modeled design values. Based on this assessment, we conclude the modeling provided by the State accurately characterizes air quality in the area of analysis.

4.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Albany County Area

These factors have been incorporated into the air quality modeling efforts and results discussed above. The EPA is giving consideration to these factors by considering whether they were properly incorporated and by considering the air quality concentrations predicted by the modeling.

4.5. Jurisdictional Boundaries in the Albany County Area

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for Albany County, New York. The EPA's goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

New York recommended that the EPA designate the entirety of Albany County as attainment. New York referenced EPA's March 20, 2015, guidance that indicated county boundaries may be appropriate for defining attainment areas in the absence of any other information that would help define a more specific boundary around SO_2 source in question. The boundaries of Albany County are well established and well known.

4.6. Other Information Relevant to the Designations for the Albany County Area

The EPA has received no third party modeling for this area. The EPA does not have any other relevant information.

4.7. The EPA's Assessment of the Available Information for the Albany County Area

The modeling analysis submitted by New York to characterize air quality in the area surrounding Lafarge, located in Albany County, indicates no violations of the 2010 SO_2 NAAQS. As discussed above, we conclude the modeling provided by the State accurately characterizes air quality in the area of analysis, and is indicative that there are no nearby nonattainment areas (or contribution to those areas).

For Albany County, the EPA believes that a full county designation (rather than a partial county designation) of unclassifiable/attainment is appropriate, as there are no other DRR sources in the county. There are several very small point sources in the Albany metropolitan area (i.e., 5-10 tons). The Loudonville air monitor, which was used by New York in its modeling for Lafarge to represent background data as previously discussed, is in close proximity (within 5 kilometers) to these smaller sources. Data collected at the monitor indicates that SO_2 concentrations are well below the NAAQS and trending downward. The most recent design value was 8 ppb (2013-2015). These data were available to EPA for consideration in the designations process, however, since it is unclear if these monitors are located in areas of maximum concentration, it is unclear if the data are representative of the area's actual air quality.

The Norlite Corporation, a slightly larger source, emitted approximately 120 tons of SO_2 in 2014. Although roughly 10 km north of the Loudonville air monitor, the EPA does not believe that the source would cause or contribute to a violation of the 2010 SO_2 NAAQS especially since modeling of Lafarge, which was modeled at approximately 800 tons higher, did not model exceedances of the NAAQS.

Although there are other sources in the county not explicitly modeled, their potential impacts are captured through the State's use of the regional background concentration. Given that the maximum modeled concentration is roughly half the level of the standard, any potential impacts from sources not explicitly modeled are not likely to yield modeled violations. Therefore, the EPA agrees the modeling submitted by the State adequately characterizes the air quality around the source and provides a good basis for a designation of unclassifiable/attainment for the entirety of Albany County.

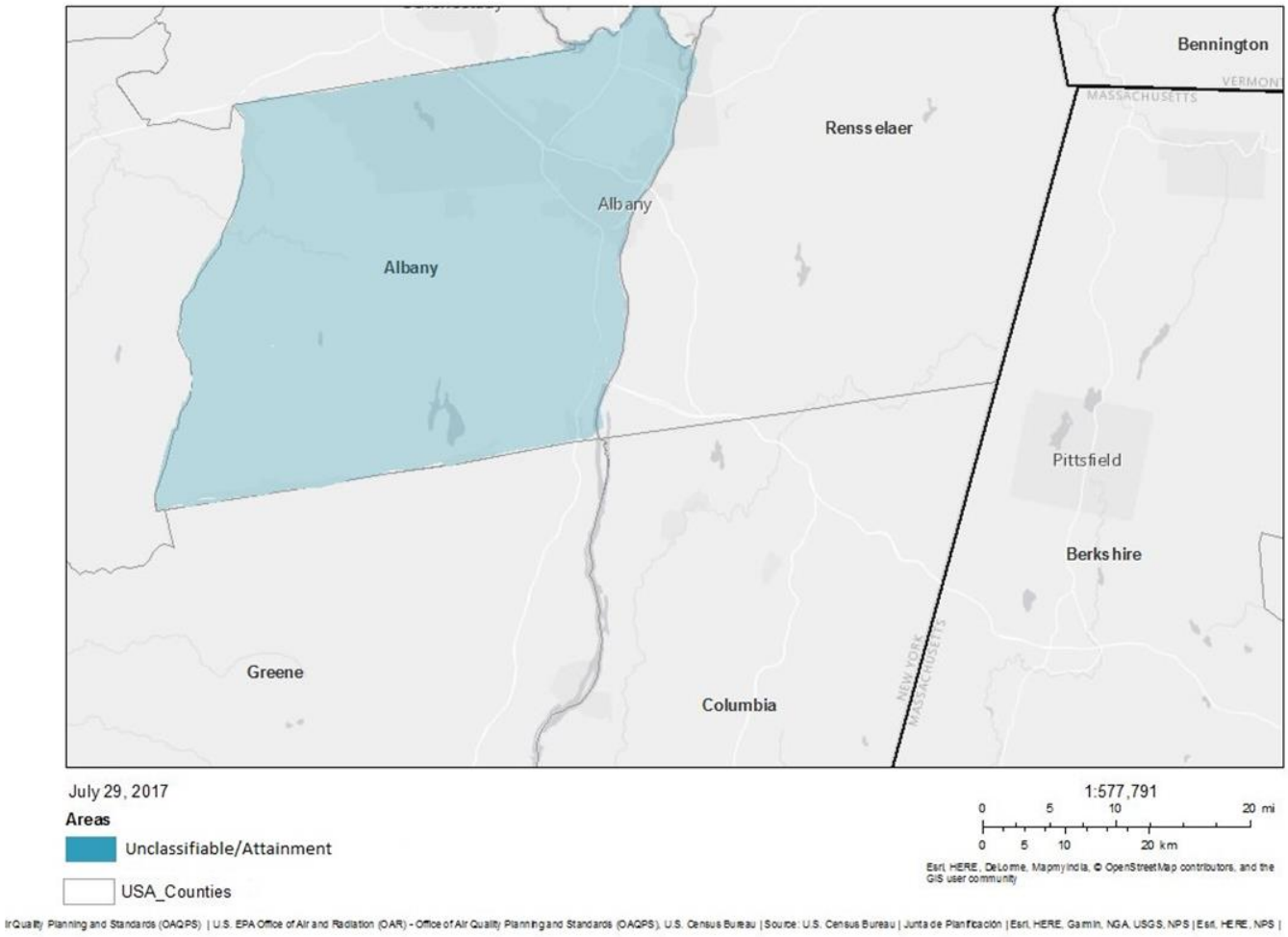
The EPA believes that our intended unclassifiable/attainment area, bounded by the borders of the county of Albany will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area.

4.8. Summary of Our Intended Designation for the Albany County Area

After careful evaluation of New York's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the Albany County area as unclassifiable/attainment for the 2010 SO_2 NAAQS, because, based on available information

including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined the area (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS. Specifically, the boundaries are comprised of borders of the county of Albany. Figure 15 shows the boundary of this intended designated area.

Figure 15. Boundary of the Intended Albany County Unclassifiable/Attainment Area



At this time, our intended designations for New York only apply to this area and the other areas presented in this technical support document. The EPA intends in a separate action to evaluate and designate all remaining undesignated areas in New York by December 31, 2020.

5. Technical Analysis for the Orange County Area

5.1. Introduction

The EPA must designate the Orange County, New York, area by December 31, 2017, because the area has not been previously designated and New York has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of any source in Orange County.

5.2. Air Quality Monitoring Data for the Orange County Area

The state does not have any existing SO2 monitoring data in the Orange County area.

5.3. Air Quality Modeling Analysis for the Orange County Area Addressing Roseton Generating Station

5.3.1. Introduction

This section presents all the available air quality modeling information for a portion of Orange County that includes Roseton Generating Station. (This portion of Orange will often be referred to as "the Orange County area" within this section). This area contains the following SO_2 source, principally the source around which New York is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- The Roseton facility does not emit 2,000 tons or more annually, but was added to the SO_2 DRR Source list by agreement between the EPA regional office and New York due to their potential for high short-term emissions.

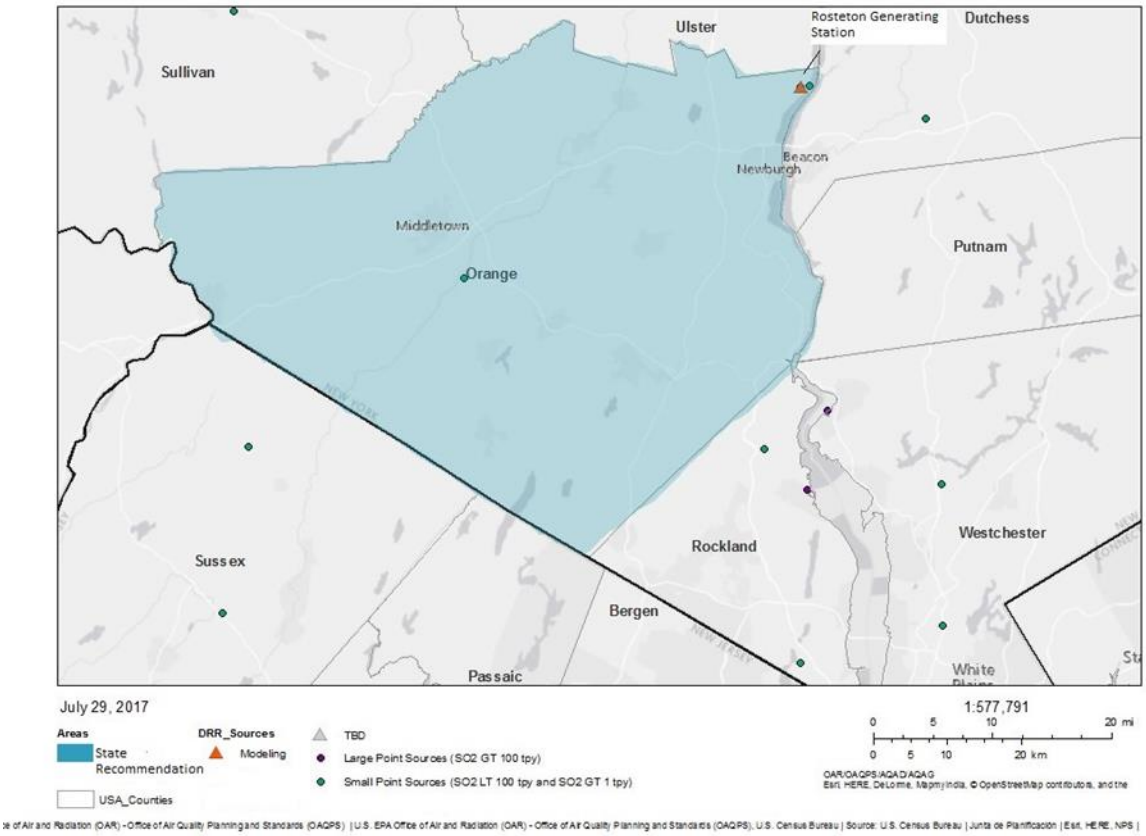
In its submission, New York recommended that an area that includes the area surrounding the facility, specifically the entirety of Orange County, be designated as attainment based in part on an assessment and characterization of air quality impacts from this facility. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions. After careful review of the State's assessment, supporting documentation, and all available data, the EPA intends to designate the area as unclassifiable/attainment. Our reasoning for this conclusion is explained in a later section of this TSD, after all the available information is presented.

The area that New York has assessed via air quality modeling is located in the town of Newburgh, New York. As seen in Figure 16 below, the Roseton facility is located on the west bank of the Hudson River in Newburgh, New York. It is approximately 8 km north-northeast of the City of Newburgh and 15 km south-southwest of the City of Poughkeepsie. To the northwest of the facility, a ridge rises to elevations of 180 m to slightly over 300 m, at a distance between 6 and 15 km from the facility. To the south-southeast of the facility at a distance of 10.3 km, Mount Beacon rises to an elevation of 491 m.

There are two small point sources in Orange County, the largest of which emitted 18 tons in 2014 (i.e., the Danskammer Generating Station), and is nearby (less than one km from Roseton). The other point source in Orange County emitted approximately one ton in 2014, and is approximately 40 km southwest. The only other nearby point source is located in Dutchess County, approximately 15 km east of Roseton, and emitted less than 5 tons in 2014.

Also included in the figure is the area that New York recommends as attainment for the designation, i.e. the entirety of Orange County. The EPA's designation boundary is shown in a figure in the section below that summarizes our intended designation.

Figure 16. Map of the Orange County Area Addressing Roseton Generating Station



The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA's July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

For this area, the EPA received and considered the modeling assessment from New York. The EPA has not conducted its own modeling of this area, and the EPA has not received modeling of this area from any other parties.

5.3.1.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

- AERMOD: the dispersion model
- AERMAP: the terrain processor for AERMOD
- AERMET: the meteorological data processor for AERMOD
- BPIPPRM: the building input processor
- AERMINUTE: a pre-processor to AERMET incorporating 1-minute automated surface observation system (ASOS) wind data
- AERSURFACE: the surface characteristics processor for AERMET
- AERSCREEN: a screening version of AERMOD

New York used AERMOD version 15181, the most up-to-date version at the time of modeling, using all regulatory default options. AERMOD version 16216r has since become the regulatory model version. There were no updates from 15181 to 16216r that would significantly affect the concentrations predicted in this case. A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

5.3.1.2. Modeling Parameter: Rural or Urban Dispersion

For the purpose of performing the modeling for the area of analysis, New York determined that it was most appropriate to run the model in rural mode.

New York came to this conclusion by using the Auer Technique and examining the land use within 3 km of the facility using the 1992 National Land Cover Database (NLCD). The area is predominantly (greater than 50%) vegetated land, water, and low-density residential and light commercial/industrial uses. The EPA finds the State's use of AERMOD rural dispersion characteristics appropriate in this case. An aerial view of Roseton Station vicinity is shown in Figure 17.

Figure 17: Aerial view of Roseton Generating Station

The land use classification was analyzed consistent with the methodology in the Modeling TAD and the EPA concurs with the assessment.

5.3.1.3. Modeling Parameter: Area of Analysis (Receptor Grid)

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

The source of SO_2 emissions subject to the DRR in this area is described in the introduction to this section. For the Orange County area, New York has included no other emitters of SO_2 within 50 kilometers (km) of the Roseton facility in any direction. The State determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS violations in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. No other sources beyond 50 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis. No other DRR sources nearby were identified. EPA does not believe there are any sources that would have caused a concentration gradient that would not have been accounted for by the ambient background monitor (see Section 5.3.1.8).

New York explicitly modeled the only relevant nearby source, i.e. Roseton. Other source contributions were accounted for in the measured background monitor data that was added to the modeled concentrations. EPA agrees with New York's approach since it follows EPA's modeling TAD.

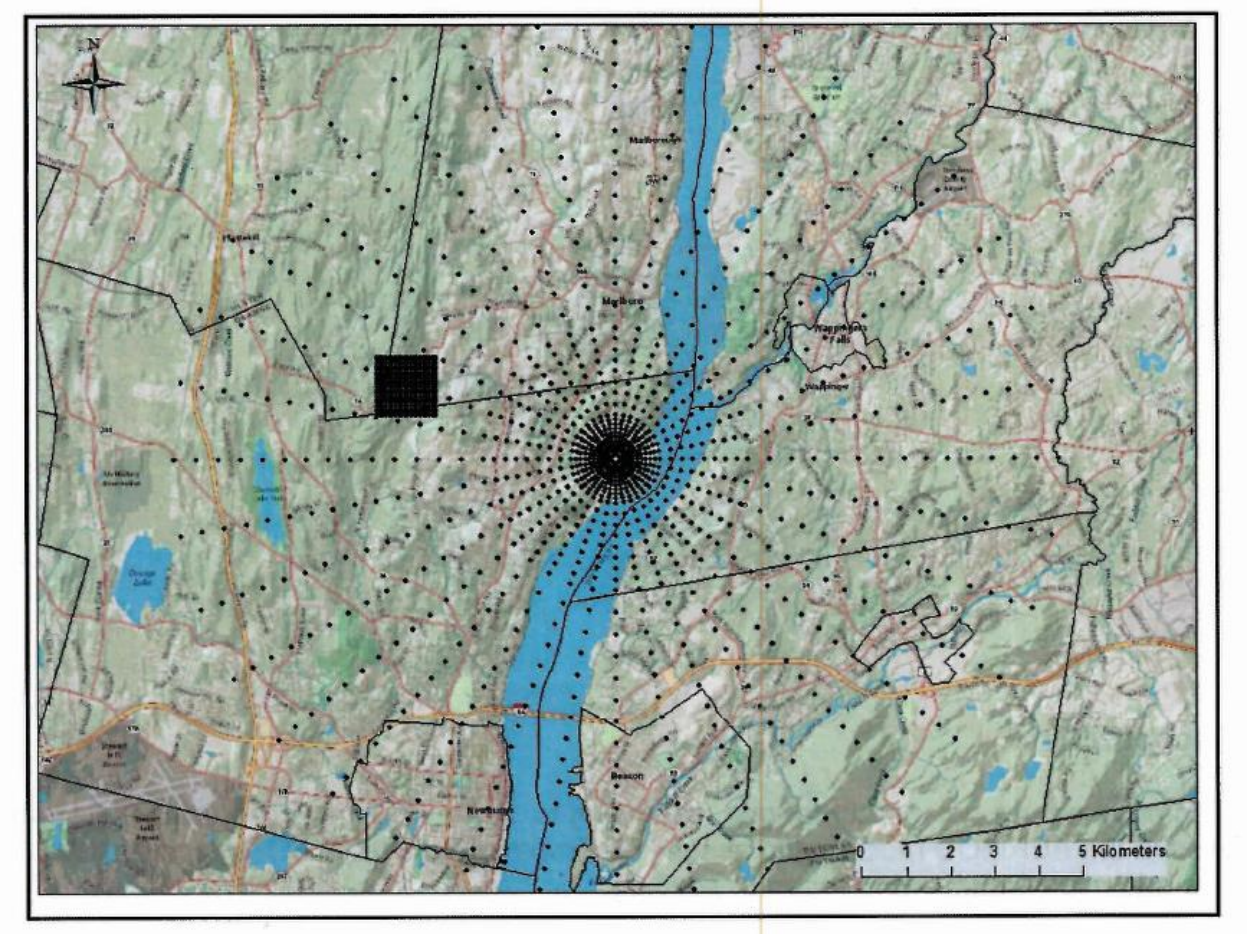
The grid receptor spacing for the area of analysis chosen by New York is as follows:

- 100 m spacing from the source to 1 km
- 250 m spacing from 1 km to 3 km
- 500 m spacing from 3 km to 10 km

The receptor network contained 1,552 receptors capturing the maximum impact area. The network covered a comprehensive polar grid extending to 10 km from the Roseton facility. The receptors were placed on 36 radials 10 degrees apart, centered on the facility. After an initial model run predicted impacts to occur in an area with 500 m receptor spacing, a nested grid with 70 m receptor spacing in the area of predicted maximum impact was added and the model was run again to properly capture the extent of the highest modeled impacts.

Figure 18, included in New York's recommendation, show the State's chosen area of analysis surrounding the Roseton facility, as well as the receptor grid for the area of analysis. New York placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to each modeled facility, including other facilities' property. New York did not exclude any receptors. The entire facility property area, which was enclosed with fencing, did not have any receptors excluded.

Figure 18: Area of Analysis and Receptor Grid for the Orange County Area



The EPA believes that with increasing distance, spatial resolution may diminish while using a polar grid (as opposed to Cartesian). In this case, the maximum impacts were approximately 5 km further away to the northwest of the facility. In order to improve the receptor resolution at this distance, the State included an additional refined Cartesian grid over the coarse polar grid to capture the maximum concentration (see Figure 18) and assure compliance with the NAAQS.

5.3.1.4. Modeling Parameter: Source Characterization

Roseton Generating Station in Newburgh was explicitly included in the modeling of the Orange County area due to its potential for high short-term emissions.

New York characterized this source within the area of analysis in accordance with the best practices outlined in the Modeling TAD. Specifically, the State used actual stack heights in conjunction with actual emissions. The State also adequately characterized the source's building layout and location, as well as the stack parameters, e.g., exit temperature, exit velocity, location, and diameter. Where appropriate, the AERMOD component BPIPPRM version 04274 was used

to assist in addressing building downwash. The EPA agrees with the modeled characterization of the Roseton facility using actual characterization such as actual stack heights.

5.3.1.5. Modeling Parameter: Emissions

The EPA's Modeling TAD notes that for the purpose of modeling to characterize air quality for use in designations, the recommended approach is to use the most recent 3 years of actual emissions data and concurrent meteorological data. However, the TAD also indicates that it would be acceptable to use allowable emissions in the form of the most recently permitted (referred to as PTE or allowable) emissions rate that is federally enforceable and effective.

The EPA believes that continuous emissions monitoring systems (CEMS) data provide acceptable historical emissions information, when they are available. These data are available for many electric generating units. In the absence of CEMS data, the EPA's Modeling TAD highly encourages the use of AERMOD's hourly varying emissions keyword HOUREMIS, or through the use of AERMOD's variable emissions factors keyword EMISFACT. When choosing one of these methods, the EPA recommends using detailed throughput, operating schedules, and emissions information from the impacted source(s).

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. For example, where a facility has recently adopted a new federally enforceable emissions limit or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

As previously noted, New York included the Roseton facility in the area of analysis. The state has chosen to model this facility using actual hourly SO_2 emissions (i.e. hourly varying CEMs data) between 2012 and 2014 which are summarized below.

For the Roseton facility, New York provided hourly actual SO_2 emissions between 2012 and 2014. This information is summarized in Table 11. A description of how the State obtained hourly emission rates is given below this table.

Table 11. Actual SO_2 Emissions Between 2012 – 2016 from Roseton in the Orange County Area

Facility Name	SO_2 Emissions (tpy)				
	2012	2013	2014	2015	2016
Roseton Generating Station	64	120	608	742	158
Total Emissions from All Modeled Facilities in the State's Area of Analysis	64	120	608	742	158

For the Roseton facility, the actual hourly emissions data were obtained from EPA's Clean Air Markets Division (CAMD) website. The EPA finds that New York appropriately used 3 years of actual hourly emissions for Roseton in the model analysis in accordance with the SO_2 Modeling TAD. The State submitted their modeling protocols in June 2016 indicating that they would model using 2012-2014 emissions because, at the time of submittal, the State considered the 2015 emission data to be preliminary. The Roseton Facility was likely burning higher sulfur coal prior to the start of the State's Part 225 limits that began in July 2016. Since the Part 225 requirement went into effect, a decrease in emissions is evident between 2015 and 2016.

5.3.1.6. Modeling Parameter: Meteorology and Surface Characteristics

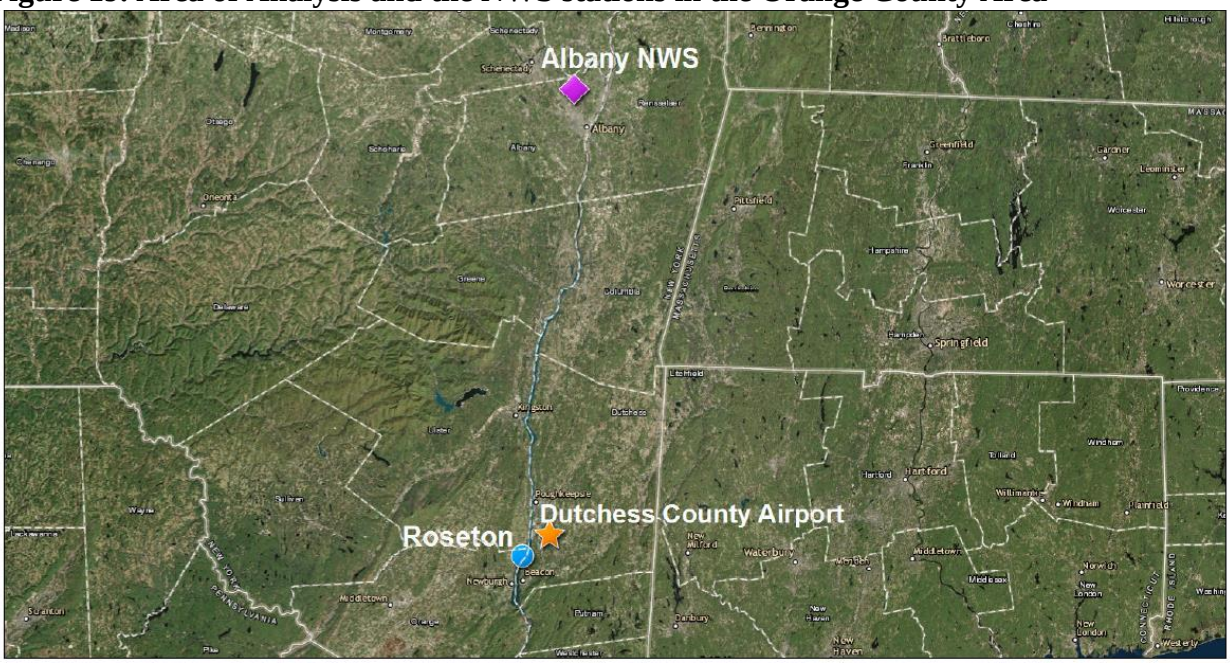
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of the data is determined based on: 1) the proximity of the meteorological monitoring site to the area under consideration, 2) the complexity of terrain, 3) the exposure of the meteorological site, and 4) the period of time during which data are collected. Sources of meteorological data include National Weather Service (NWS) stations, site-specific or onsite data, and other sources such as universities, Federal Aviation Administration (FAA), and military stations.

For the area of analysis for the Orange County area, New York selected the surface meteorology from Dutchess County Airport (POU), the NWS station in the Town of Wappinger, New York, located at 41.6257N, 73.8815W, approximately 9.6 km northeast of the facility, and coincident upper air observations from the Albany National Weather Service office, located at 42.748N, 73.803W, approximately 129 km north of the facility, as best representative of meteorological conditions within the area of analysis.

New York used AERSURFACE version 13016 using data from Dutchess County Airport to estimate the surface characteristics (albedo, Bowen ratio, and surface roughness [z_o]) of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as "z_o." For this analysis, the 1-km radius circular area centered at the meteorological station site was divided into 12 equal 30-degree sectors for the surface roughness. The Bowen ratio and albedo are based on a 10 x 10 km grid, also centered at the meteorological tower. For the Bowen ratio calculations, AERSURFACE guidance dictates the land use values can be linked to three categories of surface moisture corresponding to average, wet, and dry conditions, depending on the site and meteorological data period. For POU, normal surface moisture is 46.53 inches. The moisture is 78.4%, 85.8%, and 73.4% of normal for 2012, 2013, and 2014, respectively. Hence, the "average" surface moisture option for each month and season that is specified in the AERSURFACE users guide was used since it is representative of the location.

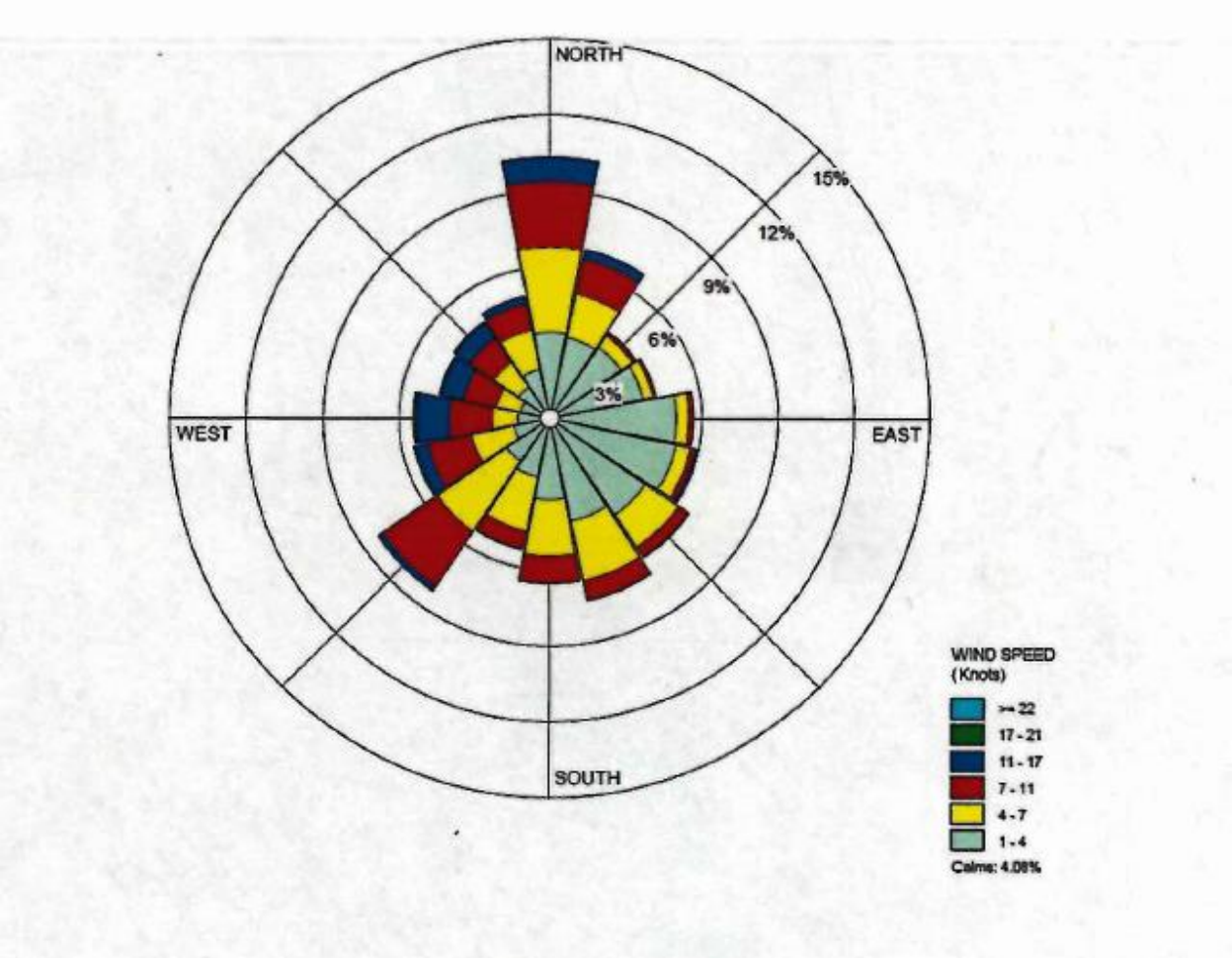
In the figure below, generated by the EPA, the locations of these NWS stations are shown relative to the area of analysis.

Figure 19. Area of Analysis and the NWS stations in the Orange County Area



As part of its recommendation, New York provided the 3-year surface wind rose for Dutchess County Airport. In Figure 20, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. While the figure shows winds from all directions, the predominant wind direction is from the north with calms occurring 4.08 percent of the time.

Figure 20: Orange County Area Cumulative Annual Wind Rose for Years 2012 – 2014



Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET version 15181 processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. New York followed the methodology and settings presented in EPA's Guidance on Air Quality Models (40 CFR Appendix W) and NYSDEC's Air Modeling Procedures as outlined in DAR-10 / NYSDEC Guidelines on Dispersion Modeling Procedures for Air Quality Impact Analysis, modified by the SO_2 NAAQS Designation Modeling Technical Assistance Document (Modeling TAD), where applicable, in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

Hourly surface meteorological data records are read by AERMET, and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of 1-minute duration was provided from the Dutchess County Airport, but in a different formatted file to be processed by a separate preprocessor, AERMINUTE version 15272 . These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration estimates. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, New York set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the 1-minute wind data.

The EPA agrees that the meteorological data is appropriate in this case since it is representative of the area and meets the criteria for representativeness specified in Section 7.2 of the SO_2 Modeling TAD. The EPA also agrees that the data was appropriately preprocessed using AERMINUTE, AERSURFACE, and AERMET. The wind rose in Figure 20 illustrates the predominate wind features of the Orange County area.

5.3.1.7. Modeling Parameter: Geography, Topography (Mountain Ranges or Other Air Basin Boundaries) and Terrain

The terrain in the area of analysis is best described as complex to gently rolling. To account for these terrain changes, the AERMAP version 11103 terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the USGS National Elevation Database terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the USGS National Elevation Database.

The EPA agrees the AERMAP preprocessor was appropriately applied by New York in this case in order to simulate the surrounding terrain.

5.3.1.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, New York chose the tier 1 approach. Hourly SO_2 data from the Mount Ninham monitor site, AQS ID #360790005, in Putnam County, New York, was used to represent background SO_2 levels in the area of Roseton Station. Mount Ninham is approximately 24 km southeast of the facility in a rural location. The single value of the background concentration for this area of analysis was determined by the State to be 16.5 micrograms per cubic meter ($\mu g/m^3$), equivalent to 6.3 ppb when expressed in 2 significant figures,[17] and that value was incorporated into the final AERMOD results.

The EPA agrees with New York's approach of including background concentration in the air quality analysis of the 1-hour SO_2 NAAQS (i.e., the use of the design value measured at the Mount Ninham ambient monitor). The ambient monitor is representative of the contribution of background sources in the Orange County area because it is only 24 km away from the source and measures contributions from other sources near the Roseton facility. .

[17] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in $\mu g/m^3$. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 $\mu g/m^3$.

5.3.1.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Orange County area of analysis are summarized below in Table 12.

Table 12. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Orange County Area

Input Parameter	Value
AERMOD Version	15181 (regulatory options)
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	2
Modeled Structures	3
Modeled Fencelines	0
Total receptors	1,552
Emissions Type	Actual
Emissions Years	2012-2014
Meteorology Years	2012-2014
NWS Station for Surface Meteorology	Dutchess County Airport (POU)
NWS Station Upper Air Meteorology	Albany National Weather Service office
NWS Station for Calculating Surface Characteristics	Dutchess County Airport (POU)
Methodology for Calculating Background SO_2 Concentration	Mount Ninham monitor (AQS ID #360790005) in Putnam County, New York Tier 1 based on 2012-2014 design value
Calculated Background SO_2 Concentration	6.3 ppb or 16.5 $\mu g/m^3$

The results presented below in Table 13 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

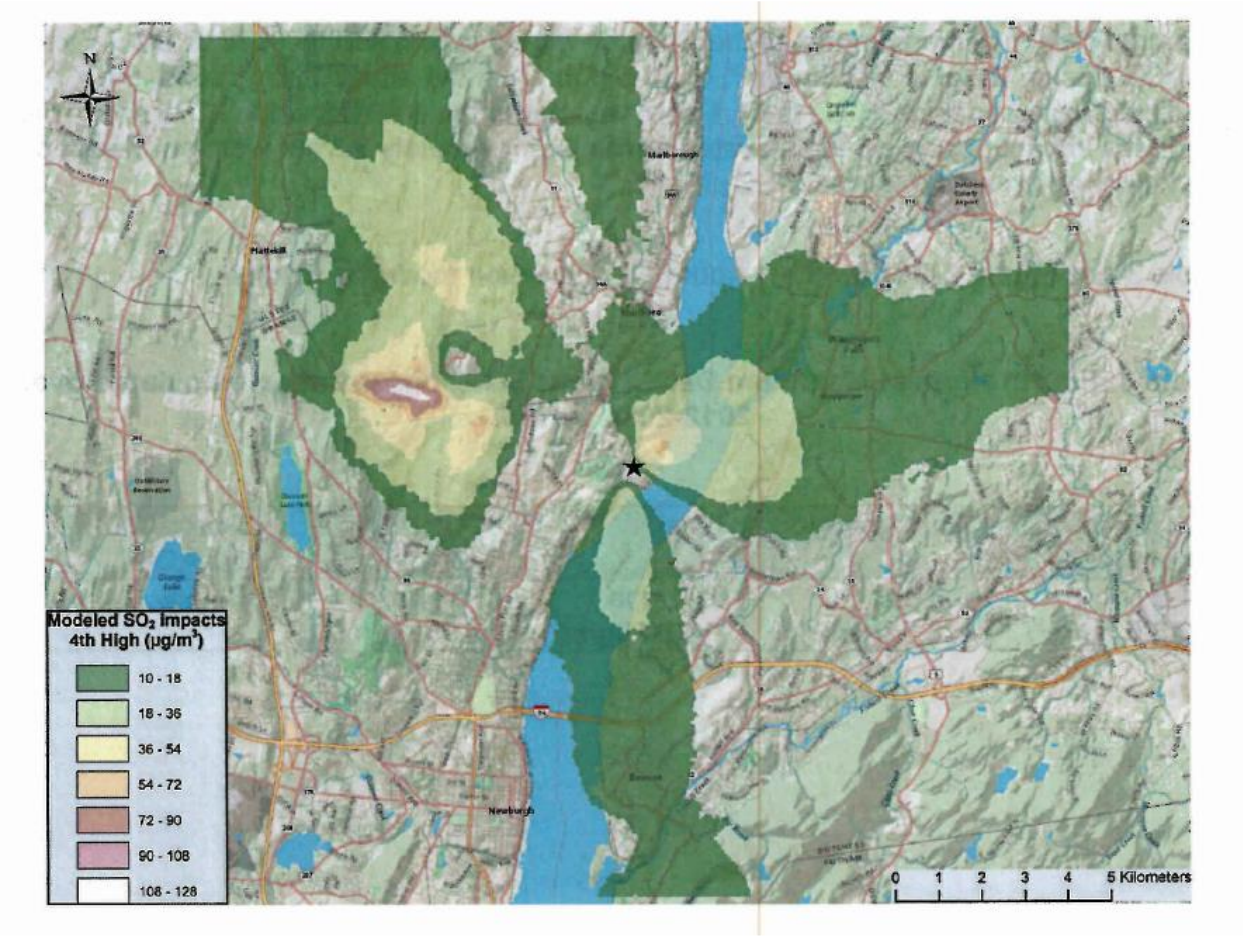
Table 13. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over Three Years for the Area of Analysis for the Orange County Area

Averaging Period	Data Period	Receptor Location [UTM zone 18N]		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM Easting	UTM Northing	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2012-2014	580420.80	4604467.87	160.0	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 $\mu g/m^3$ conversion factor

New York's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 160.0 $\mu g/m^3$, equivalent to 61.1 ppb. This modeled concentration included the background concentration of SO_2, and is based on actual emissions from the facility. Figure 21 below was included as part of the State's recommendation, and indicates that the predicted value occurred on the elevated terrain approximately 5.3 km west-northwest of the facility.

Figure 21: Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations for the Area of Analysis for the Orange County Area



The modeling submitted by the State does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled design concentration.

5.3.1.10. The EPA's Assessment of the Modeling Information Provided by the State

Based on the information provided by New York and summarized in Section 5.3, we conclude that the State adequately examined and characterized sources within the area of analysis and appropriately placed receptors in the modeling domain; appropriately initialized and accounted for modeled emission sources and building downwash; correctly selected meteorological sites and properly processed the data; adequately estimated surface characteristics; and appropriately calculated background concentrations of SO_2 to add to modeled design values. Based on this assessment, we conclude the modeling provided by the State accurately characterizes air quality in the area of analysis.

5.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Orange County Area

These factors have been incorporated into the air quality modeling efforts and results discussed above. The EPA is giving consideration to these factors by considering whether they were properly incorporated and by considering the air quality concentrations predicted by the modeling.

5.5. Jurisdictional Boundaries in the Orange County Area

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for Orange County, New York. The EPA's goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

New York recommended that the EPA designate the entirety of Orange County as attainment. New York referenced EPA's March 20, 2015, guidance that indicated county boundaries may be appropriate for defining attainment areas in the absence of any other information that would help define a more specific boundary around the SO_2 source in question. The boundaries of Orange County are well established and well known.

5.6. Other Information Relevant to the Designations for the Orange County Area

The EPA has received no third party modeling for this area. The EPA does not have any other relevant information.

5.7. The EPA's Assessment of the Available Information for the Orange County Area

The modeling analysis submitted by New York to characterize air quality in the area surrounding the Roseton Generating Station, located in Orange County, indicates no violations of the 2010 SO2 NAAQS. As discussed above, we conclude the modeling provided by the State accurately characterizes air quality in the area of analysis, and is indicative that there are no nearby nonattainment areas (or contribution to those areas). There are no nearby violating monitors, designated nonattainment areas, or deferred areas.

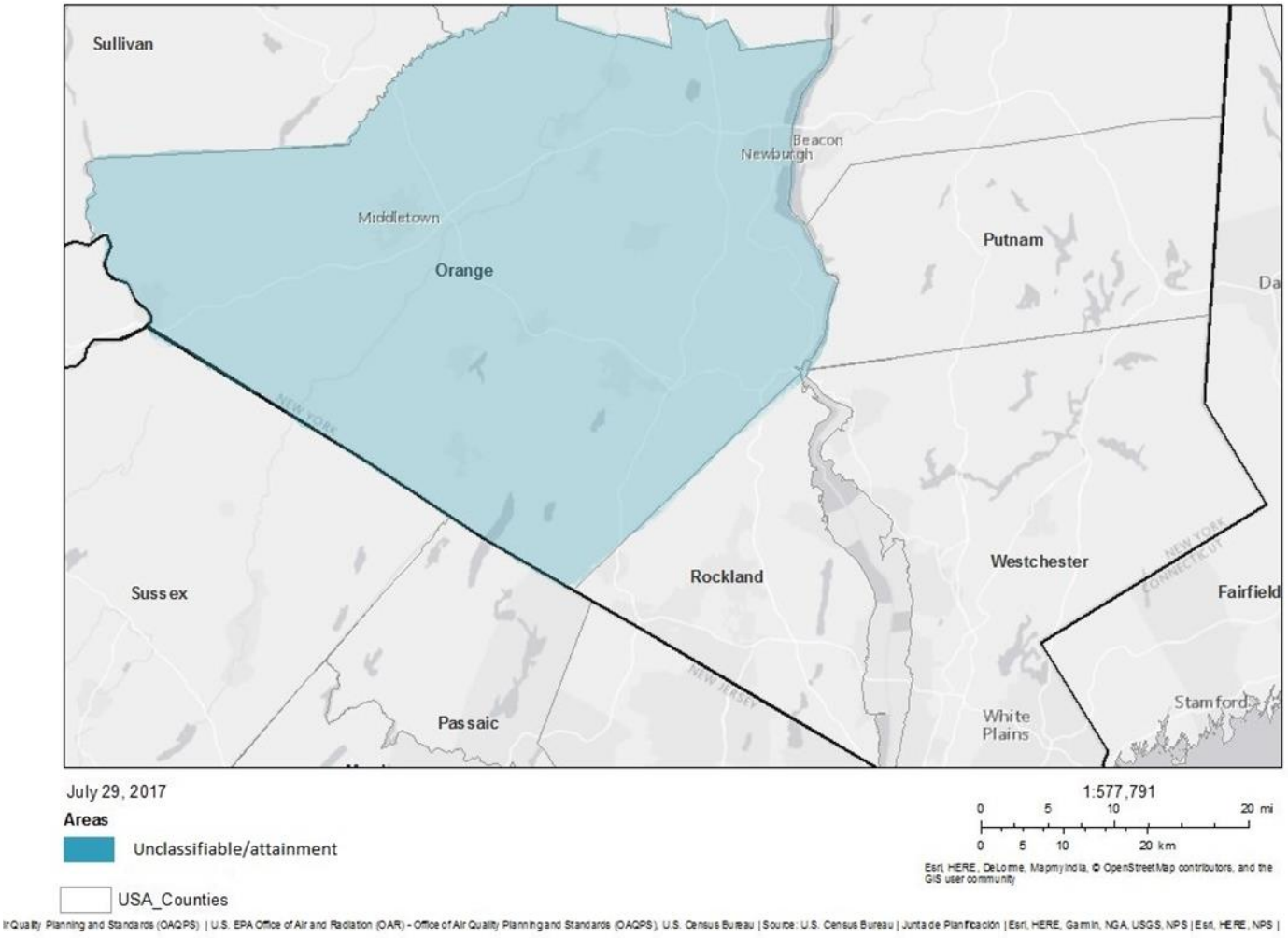
For Orange County, the EPA believes that a full county designation (rather than a partial county designation) of unclassifiable/attainment is appropriate: There are no other DRR sources in the county. There are several small point sources in Orange County, the largest of which emitted 18 tons in 2014 (i.e. Danskammer Generating Station, less than 15 km from Roseton). The EPA does not believe that the smaller sources would cause or contribute to a violation of the 2010 SO_2 NAAQS especially since modeling of the Roseton facility, which was modeled at several hundred tons higher, did not show exceedances of the NAAQS.

The EPA believes that our intended unclassifiable/attainment area, bounded by the borders of the county of Orange will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area.

5.8. Summary of Our Intended Designation for the Orange County Area

After careful evaluation of New York's recommendation and supporting information, as well as all available relevant information, the EPA agrees with the state's recommendation and intends to designate Orange County as unclassifiable/attainment for the 2010 SO_2 NAAQS, because, based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined the area (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS. Specifically, the boundaries are comprised of the borders of the county of Orange. Figure 22 shows the boundary of this intended designated area.

Figure 22. Boundary of the Intended Orange County Unclassifiable/Attainment Area



At this time, our intended designations for New York only apply to this area and the other areas presented in this technical support document. The EPA intends in a separate action to evaluate and designate all remaining undesignated areas in New York by December 31, 2020.

6. Technical Analysis for the Suffolk County Area

6.1. Introduction

The EPA must designate the Suffolk County, New York, area by December 31, 2017, because the area has not been previously designated and New York has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of any source in Suffolk County.

6.2. Air Quality Monitoring Data for the Suffolk County Area

This factor considers the SO_2 air quality monitoring data in the area of Suffolk County. New York included monitoring data from the following monitor:

- Air Quality System monitor (AQS ID 36-103-0009). This monitor is located at 57 Division Street in Holtsville in Suffolk County, New York, and is approximately 26 kilometers southeast of the Northport Power Station in Suffolk County. This monitor did not have a valid design value for any consecutive three-year period between 2008 and 2015 due to incomplete data. Data collected at this monitor produced a valid 2014-2016 design value of 7 ppb. However, this monitor was not sited to characterize the maximum 1-hour SO2 concentrations near the Newport Power Station. New York provided an air quality modeling analysis to characterize the area (see the air quality modeling section immediately below.) The EPA confirmed that there are no additional relevant data in AQS that could inform the intended designation action.

The EPA notes that the design values for 2013-2015, as well as the earlier reported periods (i.e., 2011-2013 and 2012-2014) are not considered valid since the monitor did not meet completeness criteria for calendar year. The design value is a 3-year average; the 2013-2015 DV would have averaged 2013, 2014, and 2015 calendar years. For 2013, the Holtsville monitor only had complete data for three of four quarters thus invalidating the 2013 calendar year; the monitor collected below 50 percent data capture for the third quarter (July – September). Data collected in 2014, 2015, and 2016 met data completeness requirements. For the individual calendar years 2014 and 2015, SO_2 concentrations (99^{th} percentile) were 10 ppb and 7 ppb, respectively.[18] The most recent valid design value (from 2014-2016) was 7 ppb.

New York emphasized the Holtsville monitor's design value as one of the factors for a state designation recommendation of attainment. The State also used the data from the Holtsville monitor to determine background concentrations for the air dispersion modeling; the discussion of the modeling follows immediately below.

[18] https://www.epa.gov/air-trends/air-quality-design-values

Table 14. SO_2 Monitor Design Values[19] – Suffolk County Area

AQS ID	County, State	Distance from Northport Power Station (km)	Direction from Northport Power Station	2007-2009 SO_2 Design Value (ppb)	2008-2010 SO_2 Design Value (ppb)	2011-2013 SO_2 Design Value (ppb)	2012-2014 SO_2 Design Value (ppb)	2013-2015 SO2 Design Value (ppb)	2014-2016 SO_2 Design Value (ppb)
36-103-0009	Suffolk, NY	26	SE	47	NV[20]	NV	NV	NV	7

The most recent valid design value (2014-2016) is below the NAAQS. Data collected at the monitor in Holtsville indicates SO_2 concentrations continue to trend downward. The design value went from 47 ppb for 2007-2009 to 7 ppb for 2014-2016. Due to the large distance from the Northport Power Station, the Holtsville monitor is unlikely to corroborate air modeling results discussed in the next section. New York has not provided, nor does EPA have, information to support that the monitor is in the area of maximum concentration. There are several smaller sources in Suffolk County, including the Port Jefferson Power Station (367 tons in 2014). These smaller sources are either not close to the Holtsville monitor (e.g.,11 km from the Port Jefferson Power Station), or are not in the predominant wind direction. Consequently, the monitoring data alone is not sufficient to support a conclusion that there is not a NAAQS violation in any portion of the county.

6.3. Air Quality Modeling Analysis for the Suffolk County Area Addressing Northport Power Station

6.3.1. Introduction

This section presents all the available air quality modeling information for a portion of Suffolk County that includes Northport Power Station. (This portion of Suffolk will often be referred to as "the Suffolk County area" within this section) This area contains the following SO_2 source around which New York is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- The Northport Power Station facility does not emit 2,000 tons or more annually, but was added to the SO_2 DRR Source list by agreement between the EPA and New York due to their potential for high short-term emissions.

[19] SO_2 Design values are defined as the 3-year average of the 99th percentile of the daily maximum 1-hour SO_2 concentrations.
[20] No valid (NV) design value due to incomplete data.

In its submission, New York recommended that an area that includes the area surrounding the facility, specifically the entirety of Suffolk County be designated as attainment based in part on an assessment and characterization of air quality impacts from this facility. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions. After careful review of the State's assessment, supporting documentation, and all available data, the EPA agrees with the state's recommendation for the area, and intends to designate the area unclassifiable/attainment. Our reasoning for this conclusion is explained in a later section of this TSD, after all the available information is presented.

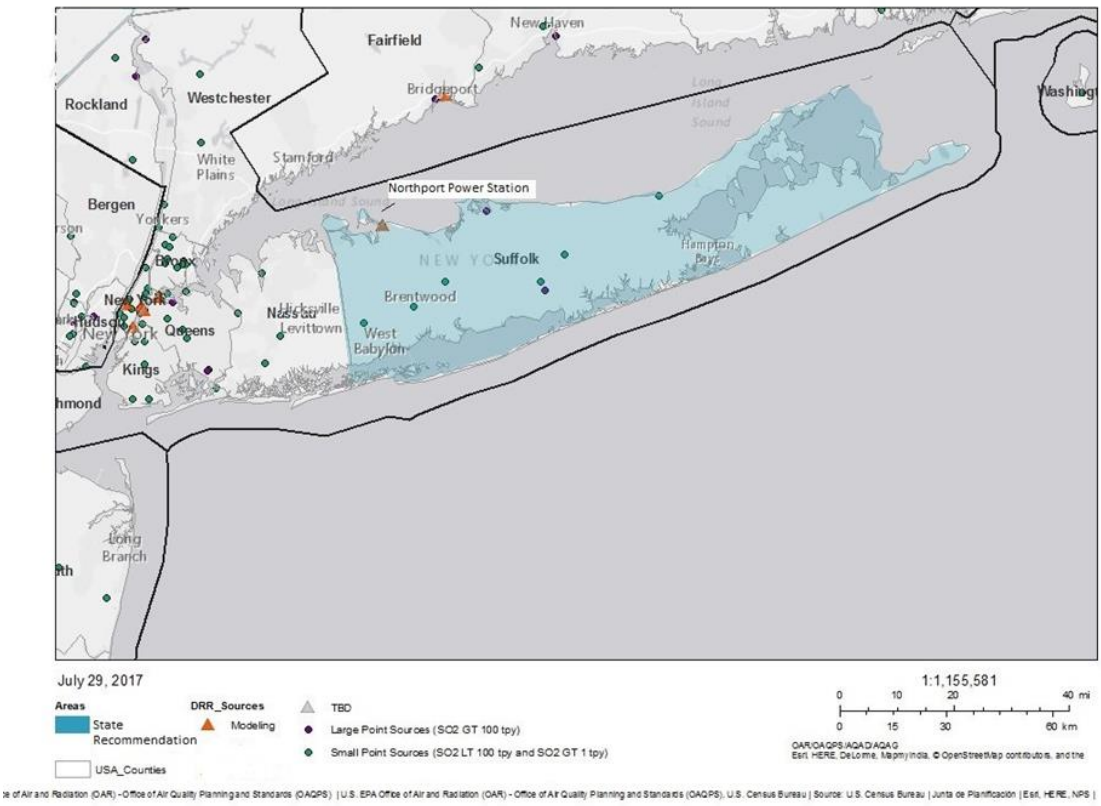
The area that New York has assessed via air quality modeling is located in Northport in Long Island, New York.

As seen in Figure 23 below, the Northport Power Station facility is located on the north shore of Long Island, at Waterside Avenue and Eatons Neck Road in Northport, New York. Nearby cities include are Town of Smithtown (3.6 km), Town of Huntington (14 km), and New York City, New York (77 km), Stamford, CT (21 km), and Bridgeport, CT (31 km). There are numerous towns and villages nearby, including the village of Northport (less than 3 km south of the facility.)

There are two moderately sized point sources in Suffolk County, the Port Jefferson Power Station, 367 tons emitted in 2014, and the Brookhaven Landfill, 151 tons, in Suffolk County. Neither facility is in close proximity: The Port Jefferson facility is approximately 20 km east of the Northport facility; the Brookhaven Landfill is 35 km east of Northport. There are six smaller point sources, as shown in the figure, all emitting less than 35 tons, approximately 20- 60 km south and east of Lafarge.

Also included in Figure 23 is the area that New York recommends as attainment for the designation, i.e. the entirety of Suffolk County. As will be shown in a figure in the section below that summarizes our intended designation, the EPA intends to apply a designation of unclassifiable/attainment to the same area.

Figure 23. Map of the Suffolk County Area Addressing Northport Power Station



The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA's July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

For this area, the EPA received and considered the modeling assessment from New York. The EPA has not conducted its own modeling of this area, and the EPA has not received modeling of this area from any other parties.

6.3.1.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

- AERMOD: the dispersion model
- AERMAP: the terrain processor for AERMOD
- AERMET: the meteorological data processor for AERMOD
- BPIPPRM: the building input processor
- AERMINUTE: a pre-processor to AERMET incorporating 1-minute automated surface observation system (ASOS) wind data
- AERSURFACE: the surface characteristics processor for AERMET
- AERSCREEN: a screening version of AERMOD

New York used AERMOD version 15181, the most up-to-date version at the time of modeling, using all regulatory default options. AERMOD version 16216r has since become the regulatory model version. There were no updates from 15181 to 16216r that would significantly affect the concentrations predicted in this case. A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

6.3.1.2. Modeling Parameter: Rural or Urban Dispersion

For the purpose of performing the modeling for the area of analysis, New York determined that it was most appropriate to run the model in rural mode.

New York came to this conclusion by using the Auer technique and examining the land use within 3 km of the facility using the 1992 National Land Cover Database (NLCD). The area is occupied predominantly by water and single-family residential buildings, with a substantial amount of vegetated land, so the use of AERMOD's rural dispersion characteristics is appropriate in this case.

The land use classification was analyzed consistent with the methodology in the Modeling TAD and the EPA concurs with the assessment.

6.3.1.3. Modeling Parameter: Area of Analysis (Receptor Grid)

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

The source of SO_2 emissions subject to the DRR in this area are described in the introduction to this section. For the Suffolk County area, New York has included no other emitters of SO_2 within 50 km of Northport in any direction. The State determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. No other sources beyond 50 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis. No other DRR sources nearby were identified. However, other background sources were accounted for in the background monitoring concentration.

New York explicitly modeled the only relevant nearby source, i.e., Northport. Other source contributions were accounted for in the measured background monitor data that was added to the modeled concentrations. EPA agrees with New York's approach since it follows EPA's modeling TAD.

The grid receptor spacing for the area of analysis chosen by New York is as follows:

- 100 m spacing extending from the source to 1 km

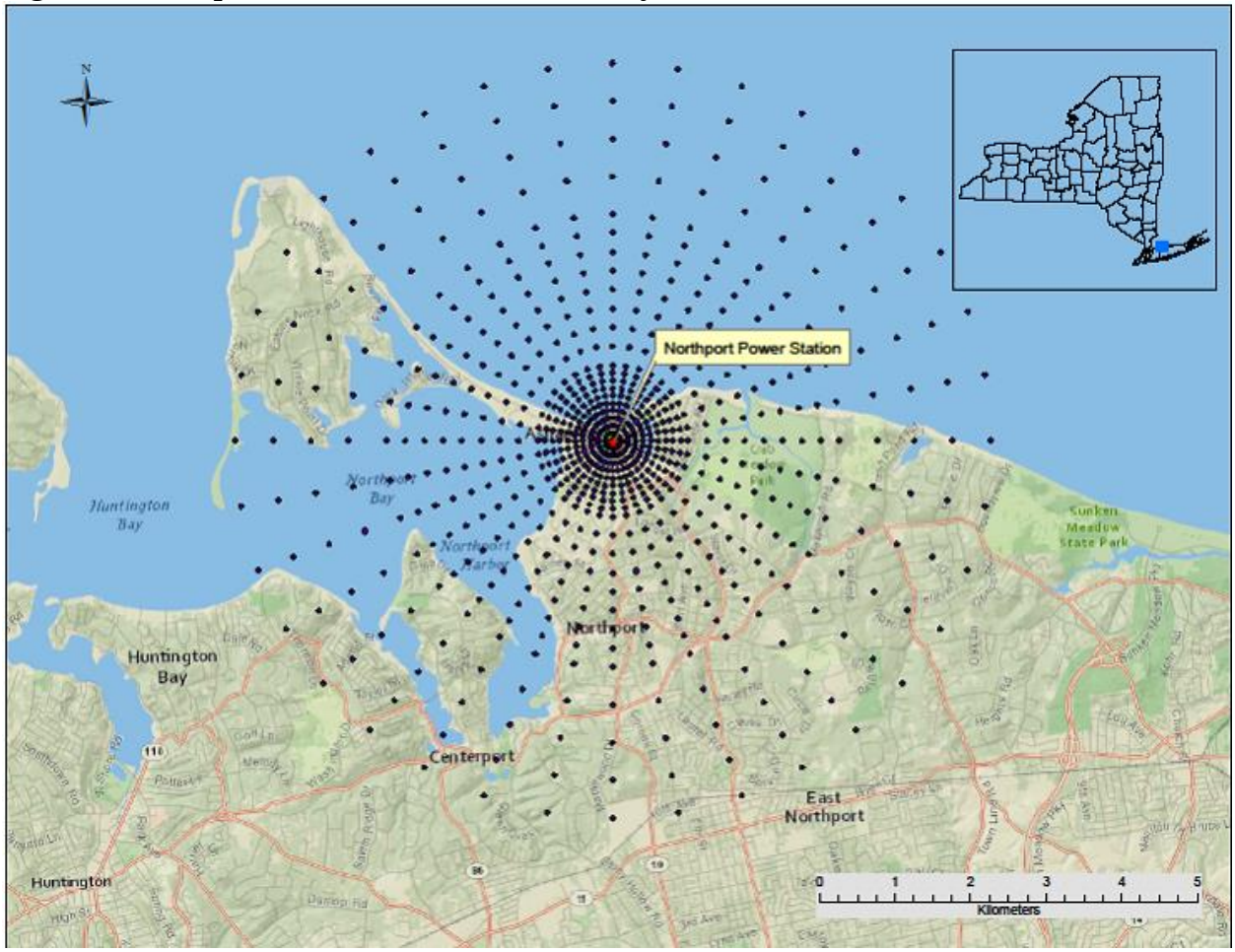
- 250 m spacing extending from 1 km to 3 km
- 500 m spacing extending from 3 km to 5 km

The receptor network contained 792 receptors capturing the maximum impact area. The network covered a comprehensive polar receptor grid, extending to 5 km from the Northport Power Station. The receptors were placed on 36 radials 10 degrees apart and the grid centered on the stack #2 emission source.

Figures 24 and 25 included in New York's recommendation, show the State's chosen area of analysis surrounding the Northport facility as well as the receptor grid for the area of analysis.

Consistent with the Modeling TAD, New York placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to each modeled facility, including other facilities' property. There were no deletions because there were no areas where it would not be feasible to place a monitor. A fence line was not used in this modeling analysis, therefore all areas surrounding the facility may have been conservatively categorized as ambient air when they potentially could have been removed from the modeling.

Figure 24: Receptor Grid for the Suffolk County Area



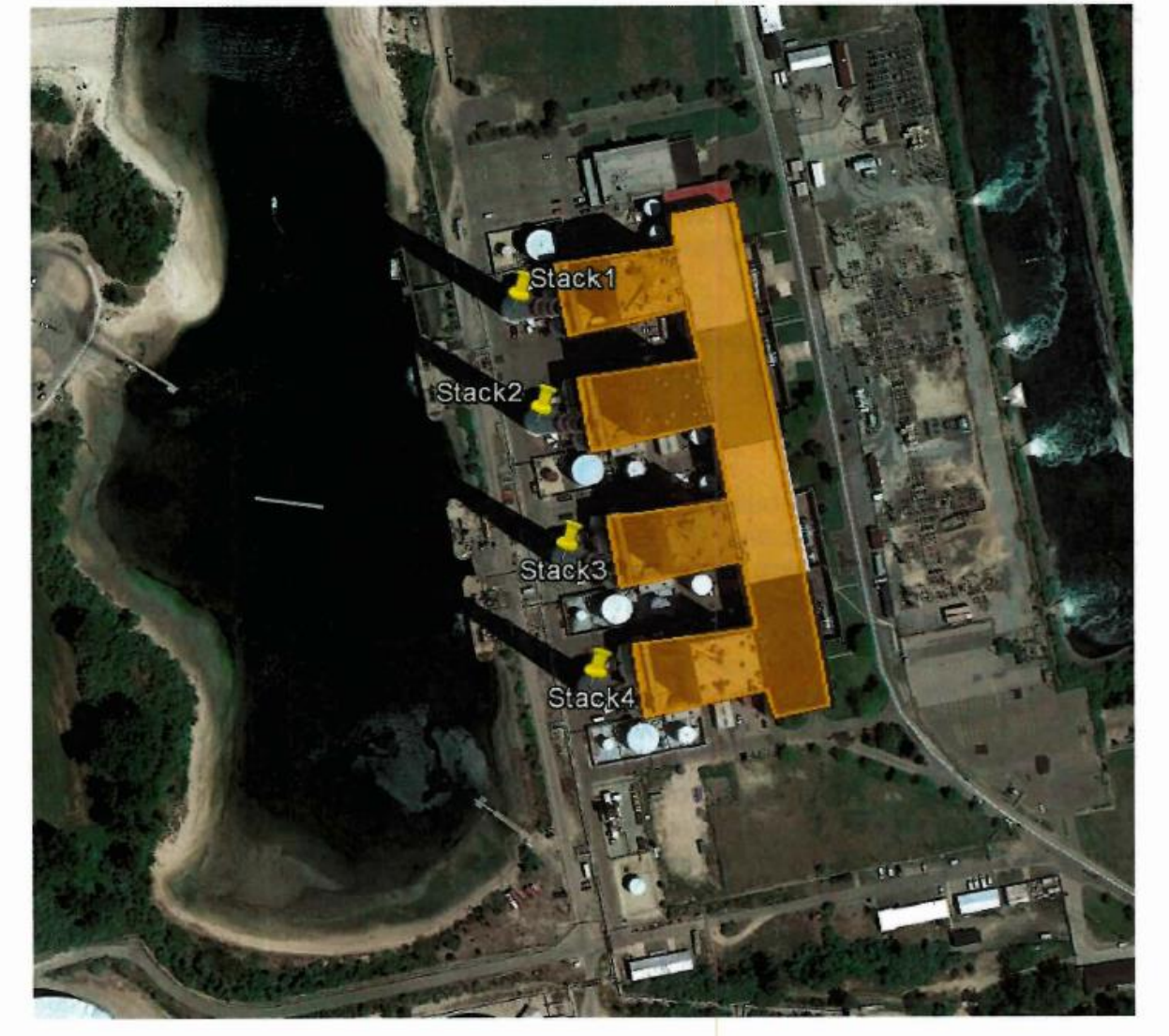
The EPA believes that with increasing distance, spatial resolution may diminish while using a polar grid (as opposed to Cartesian). However, the maximum concentration was approximately within 2 km of the facility (see Figure 28) and was well below the NAAQS. Therefore, we feel that the spatial resolution is acceptable in this case.

6.3.1.4. Modeling Parameter: Source Characterization

Northport Power Station in Northport, New York, was explicitly included in the modeling of the Suffolk County area due to its potential for high short-term emissions.

New York characterized this source within the area of analysis in accordance with the best practices outlined in the Modeling TAD. Specifically, the State used actual stack heights in conjunction with actual emissions. The State also adequately characterized the source's building layout and location, as well as the stack parameters, e.g., exit temperature, exit velocity, location, and diameter. Where appropriate, the AERMOD component BPIPPRM version 04274 was used to assist in addressing building downwash.

Figure 25: Structures and stacks included in Northport GEP analysis



The EPA agrees with the modeled characterization of the Northport facility using actual characterization such as actual stack heights.

6.3.1.5. Modeling Parameter: Emissions

The EPA's Modeling TAD notes that for the purpose of modeling to characterize air quality for use in designations, the recommended approach is to use the most recent 3 years of actual emissions data and concurrent meteorological data. However, the TAD also indicates that it would be acceptable to use allowable emissions in the form of the most recently permitted (referred to as PTE or allowable) emissions rate that is federally enforceable and effective.

The EPA believes that continuous emissions monitoring systems (CEMS) data provide acceptable historical emissions information, when they are available. These data are available for many electric generating units. In the absence of CEMS data, the EPA's Modeling TAD highly

encourages the use of AERMOD's hourly varying emissions keyword HOUREMIS, or through the use of AERMOD's variable emissions factors keyword EMISFACT. When choosing one of these methods, the EPA recommends using detailed throughput, operating schedules, and emissions information from the impacted source(s).

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. For example, where a facility has recently adopted a new federally enforceable emissions limit or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS, the State may choose to model PTE rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

As previously noted, New York included Northport Power Station in the area of analysis. The state has chosen to model this facility using actual hourly SO_2 emissions (i.e. hourly varying CEMs data). The facility included in the State's modeling analysis and its associated annual actual hourly SO_2 emissions between 2012 and 2014 are summarized below.

For the Northport facility, New York provided annual actual SO_2 emissions between 2012 and 2014. This information is summarized in Table 15. A description of how the State obtained hourly emission rates is given below this table.

Table 15. Actual SO_2 Emissions Between 2012 – 2016 from Northport in the Suffolk County Area

	SO_2 Emissions (tpy)				
Facility Name	**2012**	**2013**	**2014**	**2015**	**2016**
Northport Power Station	568	894	1,693	1,590	368
Total Emissions from All Modeled Facilities in the State's Area of Analysis	568	894	1,693	1,590	368

For the Northport facility, the actual hourly emissions data were obtained from the EPA's Clean Air Markets Division (CAMD) website.

The EPA finds that New York appropriately used 3 years of actual hourly emissions for Northport in the model analysis in accordance with the SO_2 Modeling TAD. The State submitted their modeling protocols in June 2016 indicating that they would model using 2012-2014 emissions because, at the time of submittal, the State considered the 2015 emission data to be preliminary. The Northport Facility was likely burning higher sulfur coal prior to the start of the State's Part 225 limits that began in July 2016. Since the Part 225 requirement went into effect, a decrease in emissions is evident between 2015 and 2016.

6.3.1.6. Modeling Parameter: Meteorology and Surface Characteristics

As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of the data is determined based on: 1) the proximity of the meteorological monitoring site to the area under consideration, 2) the complexity of terrain, 3) the exposure of the meteorological site, and 4) the period of time during which data are collected. Sources of meteorological data include National Weather Service (NWS) stations, site-specific or onsite data, and other sources such as universities, Federal Aviation Administration (FAA), and military stations.

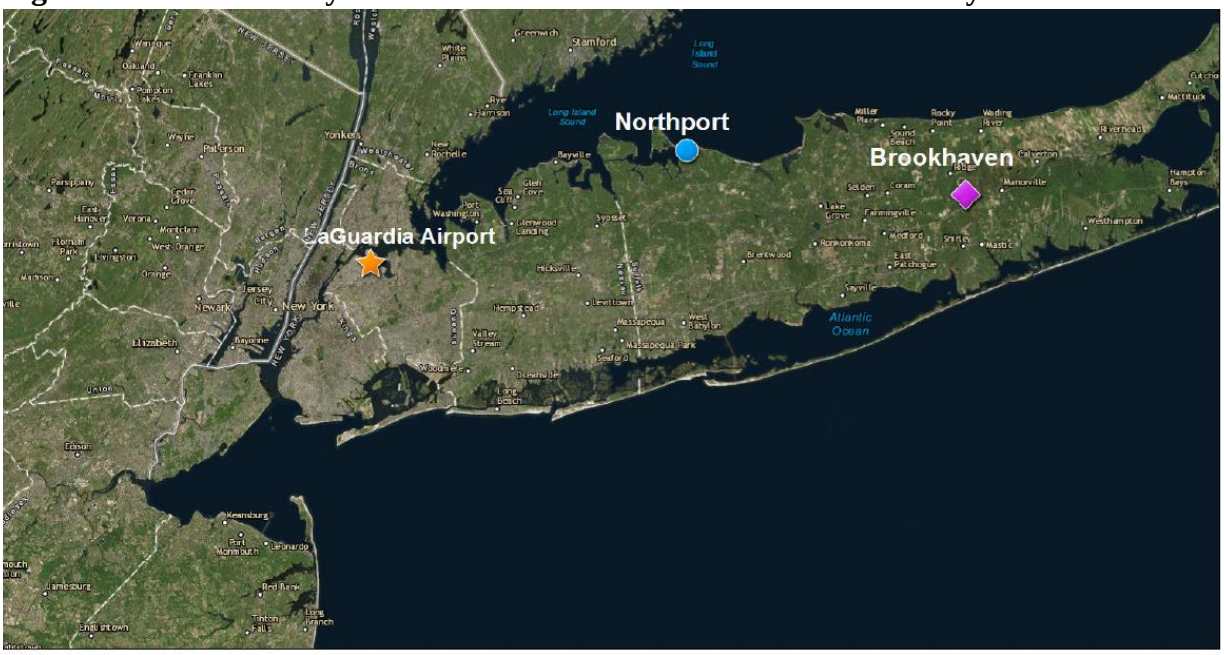
For the area of analysis for the Suffolk County area, New York selected the surface meteorology from the NWS station at LaGuardia Airport (LGA), in Queens, New York, located at 40.779N, 73.881W, approximately 50 km west of the facility, and coincident upper air observations from the NWS station at Brookhaven/Upton (OKX) in Upton, New York, located at 40.867N, 72.867W, approximately 40 km east of the facility, as best representative of meteorological conditions within the area of analysis. Note that LaGuardia Airport is not the closest weather reporting station to the Northport facility. However, the closest stations (Islip, Farmingdale, and Shirley) are also closer to the south shore of Long Island and therefore experience a different wind regime during spring and summer than locations on the north shore. LaGuardia Airport, due to its proximity to the west end of Long Island Sound, tends to have a wind pattern similar to locations on the north shore of Nassau and Suffolk Counties. On spring and summer days when sea breeze circulations dominate over synoptic-scale winds, locations along the north shore usually experience northeast or north-northeast wind from Long Island Sound beginning by mid-morning and continuing through about noon. At the same time, stations along the south shore are experiencing a developing onshore wind from the south. By later in the day, depending on the details of the weather pattern and water temperatures, the ocean breeze eventually crosses the entire island, causing winds along the north shore to shift to a southerly direction. Because of this common weather pattern, wind conditions at LaGuardia Airport were deemed to be more representative of the Northport site than closer stations near the south shore.

New York used AERSURFACE version 13016 using data from LaGuardia Airport to estimate the surface characteristics (albedo, Bowen ratio, and surface roughness [z_o]) of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as "z_o." For this analysis, the 1-km radius circular area centered at the meteorological station site was divided into 12 equal

30-degree sectors for the surface roughness. The Bowen ratio and albedo are based on a 10 x 10 km grid, also centered at the meteorological tower. For the Bowen ratio calculations, AERSURFACE guidance dictates the land use values can be linked to three categories of surface moisture corresponding to average, wet, and dry conditions, depending on the site and meteorological data period. For LGA, normal surface moisture is 44.73 inches. The moisture is 82.1%, 85.6%, and 112.5% of normal for 2012, 2013, and 2014, respectively. Hence, the "average" surface moisture option for each month and season that is specified in the AERSURFACE users guide was used since it is representative of the location.

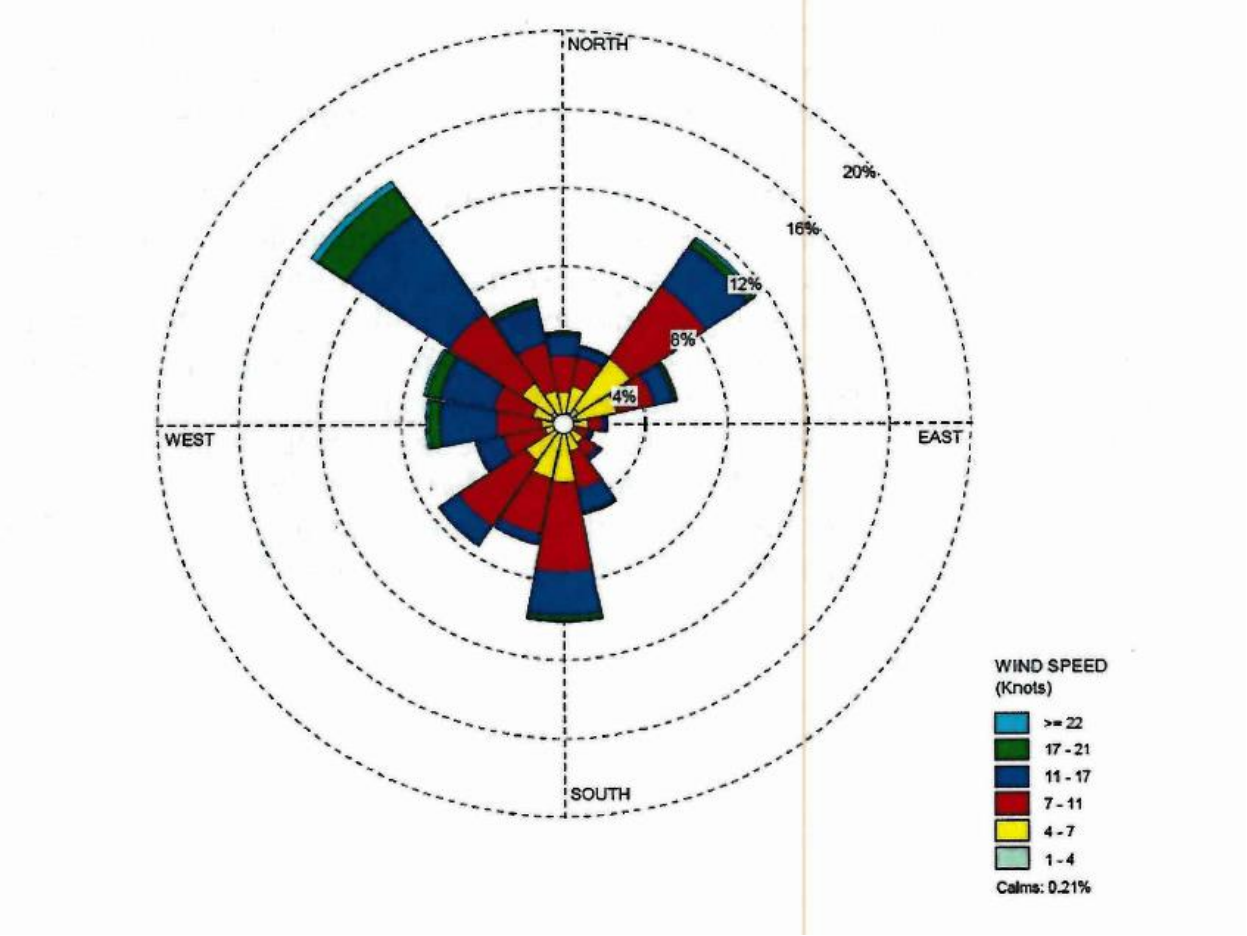
In the figure below, generated by the EPA, the locations of these NWS stations are shown relative to the area of analysis.

Figure 26. Area of Analysis and the NWS stations in the Suffolk County Area



As part of its recommendation, New York provided the 3-year surface wind rose for LaGuardia Airport. In Figure 27, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. While the figure shows winds from all directions, the predominant wind direction is from the northwest with calms occurring 0.21 percent of the time.

Figure 27: Suffolk County, NY Cumulative Annual Wind Rose for Years 2012 – 2014



Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET version 15181 processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. New York followed the methodology and settings presented in EPA's Guidance on Air Quality Models (40 CFR Appendix W) and NYSDEC's Air Modeling Procedures as outlined in DAR-10 / NYSDEC Guidelines on Dispersion Modeling Procedures for Air Quality Impact Analysis, modified by the SO_2 NAAQS Designation Modeling Technical Assistance Document (Modeling TAD), where applicable, in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

Hourly surface meteorological data records are read by AERMET, and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of 1-minute duration was provided from the first-order NWS station mentioned above, but in a different formatted file to be processed by a separate preprocessor, AERMINUTE version 15272. These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration estimates. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, New York set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the 1-minute wind data.

The EPA agrees that the meteorological data is appropriate in this case since it is representative of the area and meets the criteria for representativeness specified in Section 7.2 of the SO_2 Modeling TAD. The EPA also agrees that the data was appropriately preprocessed using AERMINUTE, AERSURFACE and AERMET. The wind rose in Figure 27 illustrates the predominate wind features of the Suffolk County area.

6.3.1.7. Modeling Parameter: Geography, Topography (Mountain Ranges or Other Air Basin Boundaries) and Terrain

The terrain in the area of analysis is best described as complex to gently rolling. To account for these terrain changes, the AERMAP version 11103 terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the USGS National Elevation Database.

The EPA agrees the AERMAP preprocessor was appropriately applied by New York in this case in order to simulate the surrounding terrain.

6.3.1.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, New York chose the tier 1 approach. The closest SO_2 monitor to the Northport facility is located in Holtsville, New York, AQS ID #36-103-0009. The single value of the background concentration for this area of analysis for the period 2012-2014 was determined by the State to be 28.6 micrograms per cubic meter ($\mu g/m^3$), equivalent to 10.9 ppb when expressed in 3 significant figures,[21] and that value was incorporated into the final AERMOD results. The EPA agrees with the State's approach of including background concentration in the air quality analysis of the 1-hour SO_2 NAAQS (i.e., the use of the design value measured at the Holtsville ambient monitor.) The EPA believes the ambient monitor is representative of the contribution of background sources in the Suffolk County area. However, as mentioned earlier in section 6.2, the 2012-2014 design value is not valid due to incomplete data obtained in calendar year 2013. The EPA notes that incorporation of either of the two complete design values: 2007-2009 design value (47 ppb), or the preliminary 2014-2016 design value (7 ppb), into the final AERMOD calculated results would demonstrate that the 1-hour SO_2 NAAQS is met.

6.3.1.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Suffolk County area of analysis are summarized below in Table 16.

[21] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in $\mu g/m^3$. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 $\mu g/m^3$.

Table 16: Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Suffolk County Area

Input Parameter	Value
AERMOD Version	15181 (regulatory options)
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	4
Modeled Structures	1
Modeled Fencelines	0
Total receptors	792
Emissions Type	Actual
Emissions Years	2012-2014
Meteorology Years	2012-2014
NWS Station for Surface Meteorology	LaGuardia Airport (LGA)
NWS Station Upper Air Meteorology	Brookhaven/Upton (OKX)
NWS Station for Calculating Surface Characteristics	LaGuardia Airport (LGA)
Methodology for Calculating Background SO_2 Concentration	Holtsville, New York (AQS ID #361030009), Tier 1 based on 2012-2014 design value
Calculated Background SO_2 Concentration	10.9 ppb[22] or 28.6 $\mu g/m^3$

The results presented below in Table 17 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

[22] The EPA calculated background, based on the 2007-2009 design value (), The DVwas conservatively added. The state's selected design value (2012-2014) was not valid due to data incompleteness in 2013. The 2007-2009 DV was the most recent valid DV at the time of EPA's analysis. The 2014-2016 DV has been subsequently finalized, and is much lower (i.e., 7 ppb).

Table 17. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over Three Years for the Area of Analysis for the Suffolk County Area

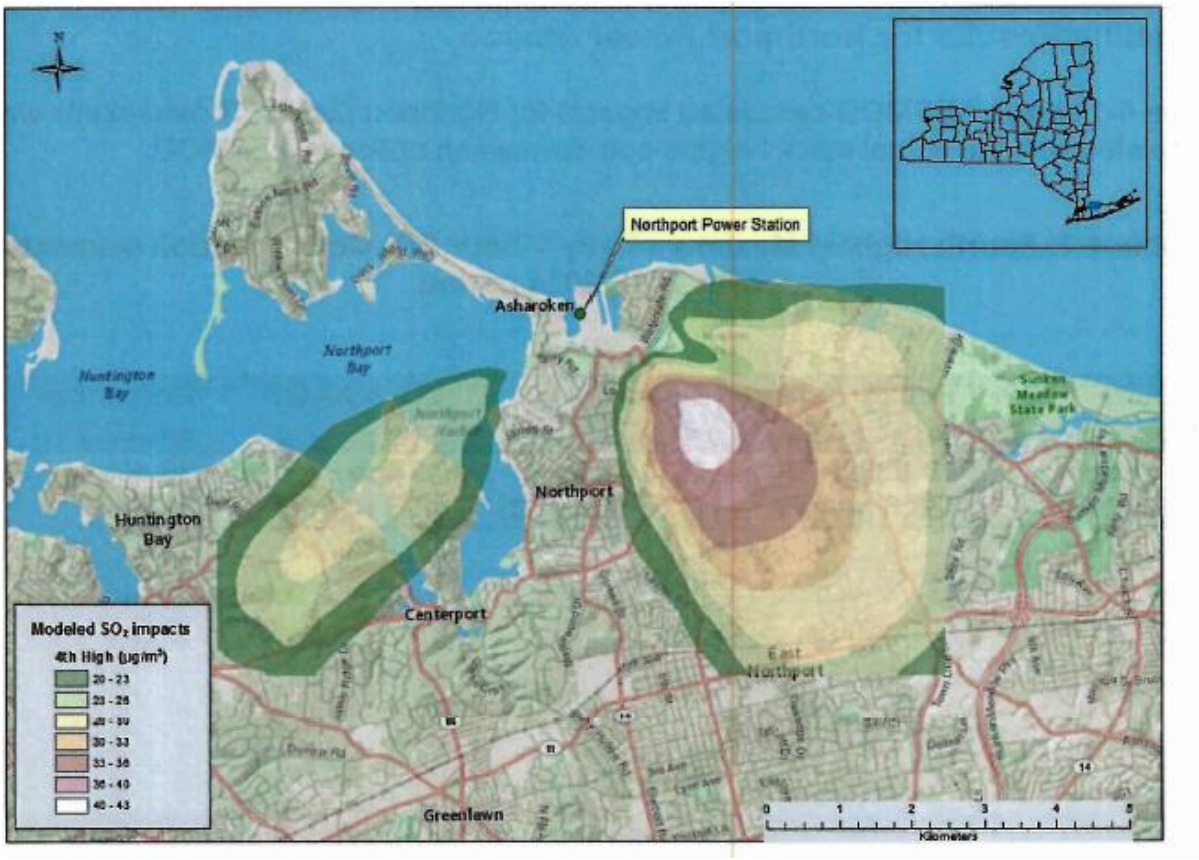
Averaging Period	Data Period	Receptor Location [UTM zone 18N]		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM Easting	UTM Northing	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2012-2014	641200.60	4530122.73	166[23]	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 $\mu g/m^3$ conversion factor

New York's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 166 $\mu g/m^3$, equivalent to 63 ppb, based on a 2007-2009 background design value, the most recent complete design value available at the time of the analysis. This modeled concentration included the background concentration of SO_2, and is based on actual hourly emissions from the facility. The EPA notes that using the since finalized 2014-2016 design value as background would indicate the highest predicted 99th percentile daily maximum 1-hour concentration as 61 $\mu g/m^3$. Figure 28 below was included as part of the State's recommendation, and indicates that the predicted value occurred to the southeast of the facility property.

[23] Calculated using 2007-2009 Design Value as background

Figure 28: Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Suffolk County Area



The modeling submitted by the State, whether using the 2007-2009 background design value or the finalized 2014-2016 background design value, does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration.

6.3.1.10. The EPA's Assessment of the Modeling Information Provided by the State

Based on the information provided by New York and summarized above, the EPA concludes that the State: adequately examined and characterized sources within the area of analysis; appropriately placed receptors in the modeling domain; appropriately initialized and accounted for modeled emission sources and building downwash; correctly selected meteorological sites and properly processed the data; and, adequately estimated surface characteristics. As mentioned previously, the design value used by the State to represent background was not valid due to incomplete data from calendar year 2013. The EPA notes that using either an earlier valid design value from 2007-09, or the since finalized 2014-2016 design value from the same location as background concentration demonstrates that the 1-hour SO_2 NAAQS is met. Based on this assessment, including the adjustment for background, the EPA concludes the modeling provided by the State accurately characterizes air quality in the area of analysis.

6.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Suffolk County Area

These factors have been incorporated into the air quality modeling efforts and results discussed above. The EPA is giving consideration to these factors by considering whether they were properly incorporated and by considering the air quality concentrations predicted by the modeling.

6.5. Jurisdictional Boundaries in the Suffolk County Area

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for Suffolk County, New York. The EPA's goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

New York recommended that the EPA designate the entirety of Suffolk County as attainment. New York referenced EPA's March 20, 2015, guidance that indicated county boundaries may be appropriate for defining attainment areas in the absence of any other information that would help define a more specific boundary around the SO_2 source in question. The boundaries of Suffolk County are well established and well known.

6.6. Other Information Relevant to the Designations for the Suffolk Area

The EPA has received no third party modeling for this area. The EPA does not have any other relevant information.

6.7. The EPA's Assessment of the Available Information for the Suffolk County Area

The modeling analysis submitted by New York to characterize air quality in the area surrounding the Northport Power Station, located in Suffolk County, indicates no violations of the 2010 SO_2 NAAQS. As discussed above, we conclude the modeling provided by the State accurately characterizes air quality in the area of analysis, and is indicative that there are no nearby nonattainment areas (or contribution to those areas). Monitoring data were available to EPA for consideration in the designations process, however, since it is unclear if these monitors are located in areas of maximum concentration, it is unclear if the data are representative of the area's actual air quality.

For Suffolk County, the EPA believes that a full county designation (rather than a partial county designation) of unclassifiable/attainment is appropriate. There are no other DRR sources in the county. There are several smaller point sources in Suffolk County, the largest of which are the Port Jefferson Station (367 tons) and Brookhaven Landfill (151 tons). The EPA does not believe that other smaller sources cause or contribute to a violation of the 2010 SO_2 NAAQS especially since modeling of the Northport Power Station, which was modeled at approximately 1,000 tons higher than any other source in the county, did not show exceedances of the NAAQS.

Although there are other sources in the country not explicitly modeled, their potential impacts are captured through the State's use of the regional background concentration. Given that the maximum modeled concentration was three times lower than the standard when considering 2014-2016 background data, any potential impacts from sources not explicitly modeled are not likely to yield modeled violations. Therefore, the EPA agrees the modeling submitted by the State adequately characterizes the air quality around the source and provides a good basis for a designation of U/A for the entirety of Suffolk County.

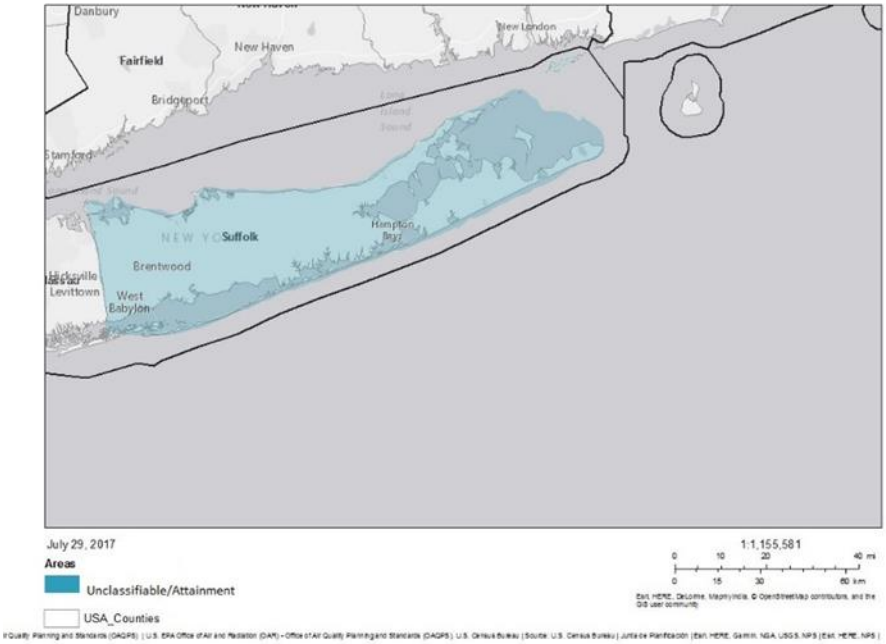
The EPA believes that our intended unclassifiable/attainment area, bounded by the borders of the county of Suffolk, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area.

6.8. Summary of Our Intended Designation for the Suffolk County Area

After careful evaluation of New York's recommendation and supporting information, as well as all available relevant information, the EPA agrees with the state's recommendation and intends to designate the Suffolk County area as unclassifiable/attainment for the 2010 SO_2 NAAQS, because, based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined the area (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS. Specifically, the boundaries of the area are comprised of borders of the county of Suffolk.

Figure 29 shows the boundary of this intended designated area.

Figure 29. Boundary of the Intended Suffolk County Unclassifiable/Attainment Area



At this time, our intended designations for New York only apply to this area and the other areas presented in this technical support document. The EPA intends in a separate action to evaluate and designate all remaining undesignated areas in New York by December 31, 2020.

7. Technical Analysis for the New York City (New York, Queens, Kings, Bronx, and Richmond Counties) Area

7.1. Introduction

The EPA must designate New York City (New York, Queens, Kings, Bronx, and Richmond Counties) by December 31, 2017, because the area has not been previously designated and New York has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of any source in New York City area.

Five electrical generating stations spread between the counties of Queens and New York are modeled for the New York City area. Individually, none of their annual emissions exceed the 2,000 tons per year threshold, but have potential for high short-term SO_2 emissions when combined. Therefore, this cluster of sources was added to the DRR source list by agreement between the EPA regional office and New York. The modeling analysis for each source will be presented and the aggregate results will be used to determine the intended designation for New York, Queens, Brooklyn, Bronx, and Richmond Counties.

7.2. Air Quality Monitoring Data for New York City

This factor considers the SO_2 air quality monitoring data in the area of New York City (New York, Queens, Kings, Bronx, and Richmond Counties). The EPA is evaluating this factor for its impact to the intended designation of New York, Queens, Kings, Bronx, and Richmond Counties.

New York included monitoring data from the following monitors:

- Air Quality System monitor (AQS ID 36-005-0110). This monitor is located at Intermediate School 52 (IS52), 681 Kelly Street in Bronx County, and is up to 11 km north/ northeast of the five power stations requiring air quality characterization, and further discussed in the modeling results presented in the next section, below. Data collected at this monitor indicates a 2013-2015 design value of 14 ppb and a 2014-3016 design value of 11 ppb. The EPA notes that the 2012-2014 design value was not valid due to data completeness issues. Data collected at IS52 indicates SO_2 concentrations below the NAAQS and trending slightly downward.
- Air Quality System monitor (AQS ID 36-005-0133). This monitor is located at the Pfizer Research Laboratory located at the New York Botanical Garden at 200th Street and Southern Boulevard in Bronx County, and is up to 17 km northeast of the five power stations requiring air quality characterization, and further discussed in the modeling results presented in the next section. Data collected at this monitor indicates a 2013-2015 design value of 16 ppb and a 2014-2016 design value of 11 ppb. Data collected at Pfizer Lab indicates SO_2 concentrations below the NAAQS, and trending slightly downward.

- Air Quality System monitor (AQS ID 36-081-0124). This monitor is located at Queens College at 65-30 Kissena Boulevard in Queens County, and is up to 17 km east southeast of the five power stations requiring air quality characterization, and further discussed in the modeling results presented in the next section. Data collected at this monitor indicates a 2013-2015 design value of 11 ppb and a 2014-2016 design value of 9 ppb. Data collected at Queens College indicates SO_2 concentrations below the NAAQS, and trending slightly downward.

New York previously operated an SO_2 monitor in New York County, Public School, 228 E. 57TH (AQS Site ID 36-061-0056) that has since been discontinued. The most recent design value (from 2005-2007) measured 63 ppb.

New York factored the lack of violation of the NAAQS by a wide margin at the Queens College monitor as one of the factors for a designation recommendation of attainment for Queens County. The state evaluated the data from the three monitors listed above to determine background concentrations for the air dispersion modeling. To model the largest concentration possible, the highest background value (from the New York Botanical Garden) was used by New York in its modeling; the discussion of the modeling follows immediately below.

Table 18. SO_2 Design Monitor Design Values – New York County and Queens County Area

Monitor	AQS ID	County, State	Distance from 5 Power Stations (km)	Direction from 5 Power Stations	2011-2013 SO_2 Design Value (ppb)	2012-2014 SO_2 Design Value (ppb)	2013-2015 SO_2 Design Value (ppb)	2014-2016 SO_2 Design Value (ppb)
IS 52	36-005-0110	Bronx, NY	Up to 11.5 km	N, NE	NV[24]	NV	14	11
Pfizer Lab/ New York Botanical Garden	36-005-0133	Bronx, NY	Up to 17 km	NE	31	22	16	11
Queens College 2	36-081-0124	Queens, NY	Up to 15 km	E, SE	20	14	11	9

There are multiple smaller point sources (below 40 tons in New York, Queens, Bronx, and Kings Counties), and several moderately sized point sources in Queens County, i.e. Kennedy Airport (440 tons in 2014), and LaGuardia Airport (206 tons). New York did not provide any information that the monitors are located in the maximum impact areas for these other SO_2 sources that were not included in the modeling for the countries. Due to the large distance from the five power stations, the monitors located in Bronx and Queens are unlikely to corroborate air modeling results discussed in the next section. New York has not provided, nor does EPA have,

[24] No valid (NV) design value due to incomplete data.

information to support that any of the monitors were sited to characterize the maximum 1-hour SO_2 concentration near the modeled facilities in the next section or for the New York City area. Consequently, the monitoring data alone is not sufficient to support a conclusion that there is not a NAAQS violation in any portion of the area. Therefore, EPA has accepted air quality modeling from New York to assess air quality for the area. There are no additional relevant monitoring data in AQS that could inform the intended designation action.

7.3. Air Quality Modeling Analysis for the New York City Area Addressing New York City Power Stations

7.3.1. Introduction

This section presents all the available air quality modeling information for a portion of New York City (New York, Queens, Kings, Bronx, and Richmond Counties) that includes the New York City Power Stations. This area contains the following SO_2 sources around which New York is required by the DRR to characterize SO_2 air quality:

- The Consolidated Edison – 59th Street Station facility does not emit 2,000 tons or more annually, but was added to the SO_2 DRR Source list by agreement between the EPA regional office and New York due to its potential for high short-term SO_2 emissions when combined with nearby sources in the area. The facility emitted 68 tons of SO_2 in 2014. The allowable PTE (used by NY in its modeling) for this facility was 243 tons of SO_2.

- The Consolidated Edison – 74th Street Station facility does not emit 2,000 tons or more annually, but was added to the SO_2 DRR Source list by agreement between the EPA regional office and New York due to its potential for high short-term SO_2 emissions when combined with nearby sources in the area. This facility emitted 76 tons of SO_2 in 2014.

- The Consolidated Edison – East River Generating Station facility does not emit 2,000 tons or more annually, but was added to the SO_2 DRR Source list by agreement between the EPA regional office and New York due to its potential for high short-term SO_2 emissions when combined with nearby sources in the area. This facility emitted 165 tons of SO_2 in 2014.

- The Astoria Generating Station facility does not emit 2,000 tons or more annually, but was added to the SO_2 DRR Source list by agreement between the EPA regional office and New York due to its potential for high short-term SO_2 emissions when combined with nearby sources in the area. This facility emitted 218 tons of SO_2 in 2014.

- The Ravenswood Generating Station facility does not emit 2,000 tons or more annually, but was added to the SO_2 DRR Source list by agreement between the EPA regional office and New York due to its potential for high short-term SO_2 emissions when combined with nearby sources in the area. This facility emitted 296 tons of SO_2 in 2014.

Because we have available results of air quality modeling in which these sources are modeled together, the area around this group of sources is being addressed in this section with consideration given to the impacts of all these sources.

In its submission, New York recommended that an area that includes the area surrounding the five modeled facilities, specifically the entirety of New York, Queens Kings, Bronx, and Richmond Counties be designated as attainment based in part on an assessment and characterization of air quality impacts from these facilities. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing a mixture of actual and allowable emissions. After careful review of the State's assessment, supporting documentation, and all available data, the EPA agrees with the state's recommendation for the area and intends to designate the area as unclassifiable/attainment. Our reasoning for this conclusion is explained in a later section of this TSD, after all the available information is presented.

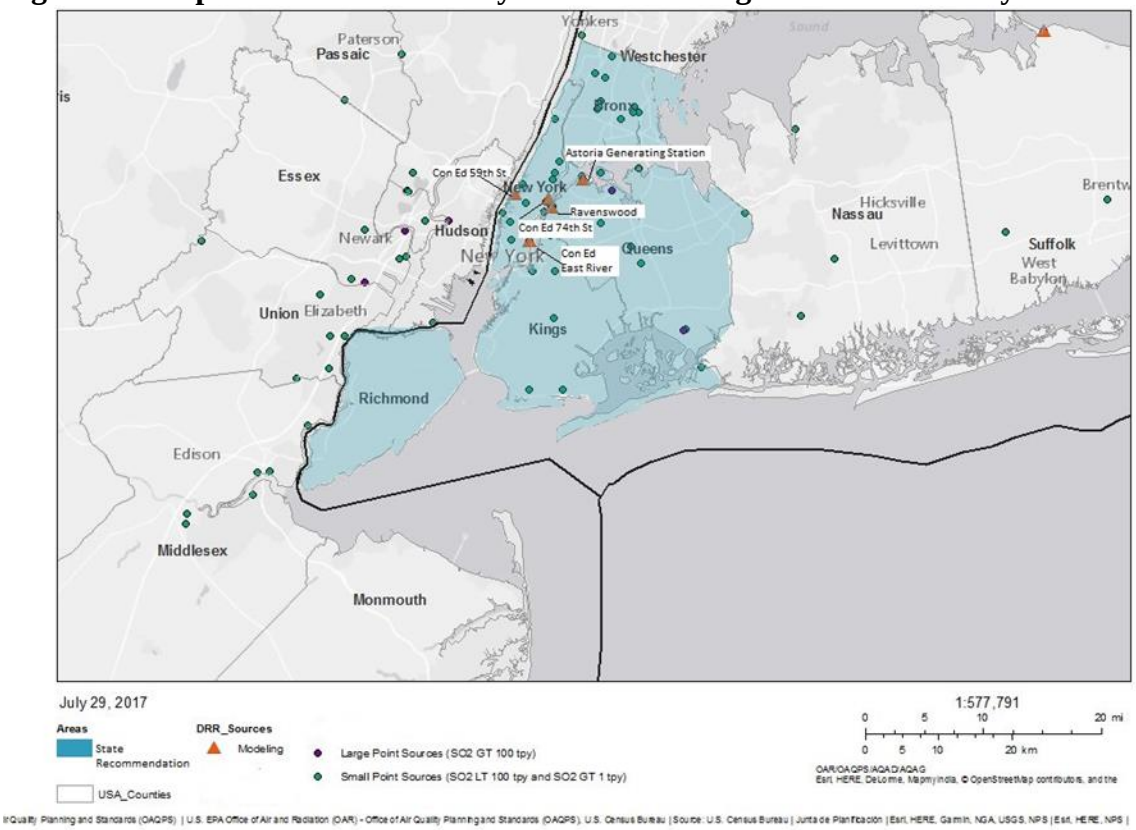
The area that New York has assessed via air quality modeling is located in New York, Queens, Kings, Bronx, and Richmond Counties.

As seen in Figure 30 below: the Consolidated Edison – 59th Street Station facility is located on the west side of Manhattan and the east bank of the Hudson River at 850 12th Avenue; the Consolidated Edison – 74th Street Station facility is located on the east side of Manhattan and the west bank of the East River between 74th and 75th Streets; the Consolidated Edison – East River Generating Station facility is located on the east side of Manhattan and the west bank of the East River at Avenue C and E 14th Street (about 5 km southwest of Consolidated Edison – 74th Street Station); the Astoria Generating Station facility is located on the east bank of the East River in the Borough of Queens at 18-01 20th Avenue; and, the Ravenswood Generating Station facility is located, on the east bank of the East River in the Borough of Queens at 38-54 Vernon Boulevard (about 4 km southwest of the Astoria Generating Station).

There are multiple other point sources above 1 ton in New York City in the counties of Queens, New York, Kings, and the Bronx. There are no point sources above 1 ton in Richmond County. In Queens County, there are two moderately sized sources: Kennedy Airport, which emitted 440 tons of SO_2 in 2014, and LaGuardia Airport, which emitted 206 tons of SO_2 in 2014. Furthermore, there are eleven point sources emitting 12 tons or less annually. In New York County, there are 12 point sources emitting under 40 tons annually. In Bronx County, there are 9 point sources emitting less than 35 tons annually. In Kings County, there are 6 point sources emitting under 10 tons annually.

Also included in the figure is the area that New York recommends for attainment for the designation, i.e., the entirety of New York City (New York, Queens, Kings, Bronx, and Richmond Counties). The designation boundary is shown in a figure in the section below that summarizes our intended designation.

Figure 30. Map of the New York City Area Addressing the New York City Power Stations



The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA's July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

For this area, the EPA received and considered the modeling assessment from New York. The EPA has not conducted its own modeling of this area, and the EPA has not received modeling of this area from any other parties.

7.3.1.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

- AERMOD: the dispersion model
- AERMAP: the terrain processor for AERMOD
- AERMET: the meteorological data processor for AERMOD
- BPIPPRM: the building input processor
- AERMINUTE: a pre-processor to AERMET incorporating 1-minute automated surface observation system (ASOS) wind data
- AERSURFACE: the surface characteristics processor for AERMET
- AERSCREEN: a screening version of AERMOD

The state used AERMOD version 15181, the most up-to-date version at the time of modeling, using all regulatory default options. AERMOD version 16216r has since become the regulatory model version. There were no updates from 15181 to 16216r that would significantly affect the concentrations predicted in this case. A discussion of New York's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

7.3.1.2. Modeling Parameter: Rural or Urban Dispersion

For the purpose of performing the modeling for the area of analysis, New York determined that it was most appropriate to run the model in urban mode, based on the use of the Auer technique and an examination of land use within 3 km of each site using the 1992 National Land Cover Database (NLCD). A population of 8 million was used as representative for the New York area. The land use classification was analyzed consistent with the methodology in the Modeling TAD and the EPA concurs with the assessment.

7.3.1.3. Modeling Parameter: Area of Analysis (Receptor Grid)

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

The sources of SO_2 emissions subject to the DRR in this area are described in the introduction to this section. For the New York City area, New York has included no other emitters of SO_2 within 50 km of the New York City Power Stations in any direction. The state determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. No other sources beyond 50 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis. There are multiple smaller sources (below 40 tons in New York, Queens, Bronx, and Kings Counties), and several moderately sized sources in Queens County, including Kennedy Airport (440 tons in 2014), and LaGuardia Airport (206 tons). No other DRR sources were nearby were identified. Any background sources were accounted for in the background monitoring concentration.

All five facilities were modeled in a single model run. The grid receptor spacing for the area of analysis for each facility chosen by New York is as follows:

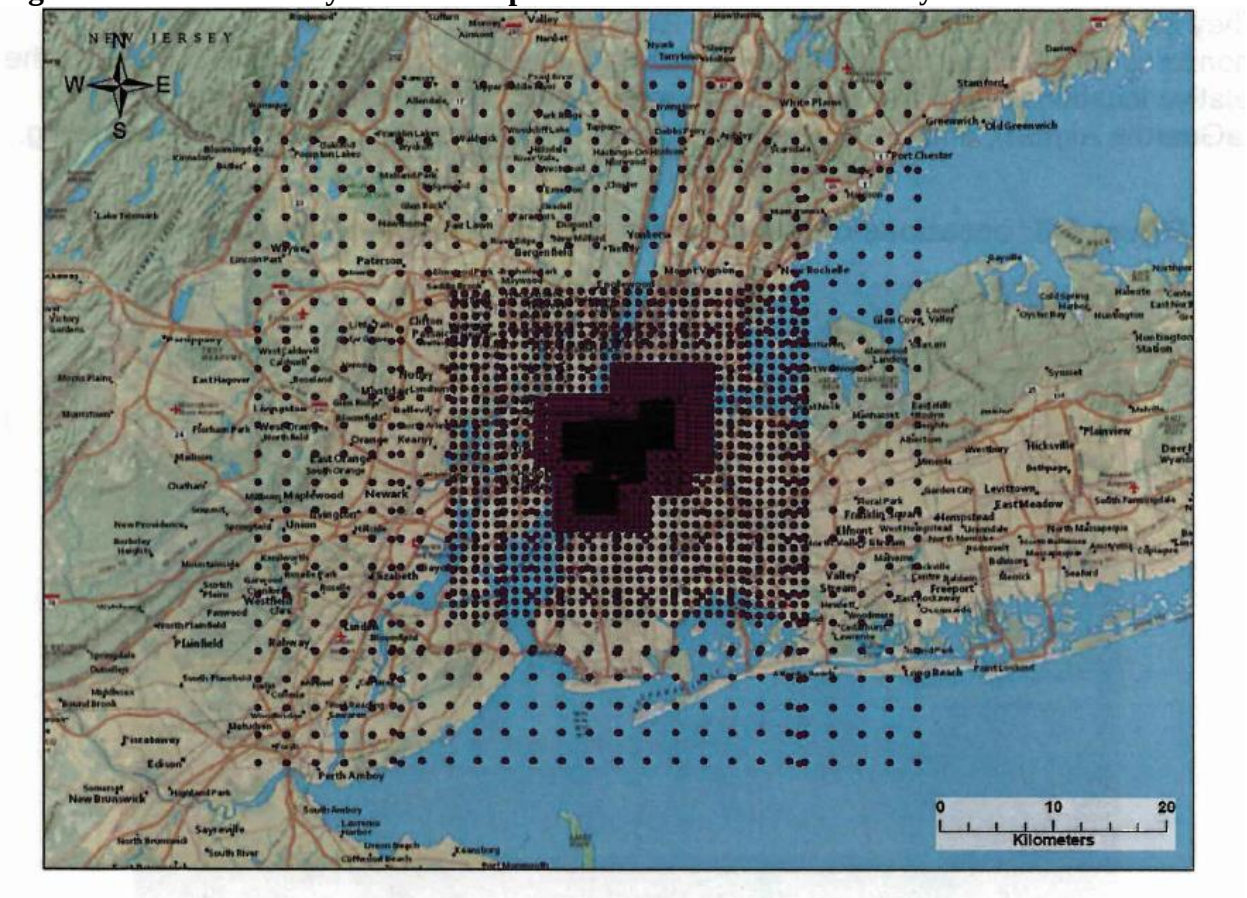
- 70 m spacing from the source out to 1 km
- 500 m spacing from 1 km to 2.5 km
- 1,000 m spacing from 2.5 km to 10 km
- 2,500 m spacing from 10 km to 20 km

The receptor network contained 12,401 receptors capturing the maximum impact area. The network covered an area of approximately 50 km by 50 km. Each facility had its own Cartesian

grid with the above described spacing. The grid completely covers New York, Queens, Kings, and Bronx Counties, and extends into New Jersey. Richmond County is almost completely covered by the receptor grid except for the small southernmost portion (i.e., residential neighborhood of Tottenville).

Figure 31, included in New York's recommendation, show the state's chosen area of analysis surrounding the facilities, as well as the receptor grid for the area of analysis. Consistent with the Modeling TAD, New York placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to each modeled facility, including other facilities' property. The entire facility property area was considered ambient air by the state, and receptors were also include over water. Facility fencelines were not included in the calculations by the state, therefore no receptors were excluded.

Figure 31: Area of Analysis and Receptor Grid for the New York City Area



An extensive coarse and refined Cartesian receptor grid covering the maximum area of impact was included in the modeling, and hence is acceptable by the EPA.

7.3.1.4. Modeling Parameter: Source Characterization

The New York City Power Stations were explicitly included in the modeling of the New York City area due to their potential for relatively high short-term SO_2 emissions. None of these facilities individually exceeds the DRR annual emissions threshold of 2,000 tons of SO_2.

New York characterized these sources within the area of analysis in accordance with the best practices outlined in the Modeling TAD. Specifically, the State used actual stack heights and actual emissions for all facilities except for the 59th Street Consolidated Edison station. The state also adequately characterized the source's building layout and location, as well as the stack parameters, e.g., exit temperature, exit velocity, location, and diameter. Since the stack exit velocity and temperature were not available on an hourly basis, they were obtained from New York State Department of Environmental Conservation's (NYSDEC) Air Facilities System (AFS) database, and assumed constant for each hour of the 3-year period. The stack locations, heights, and diameters were also obtained from the AFS database. Modeling was done without including downwash. To the extent that downwash can even be accurately simulated in the dense urban environment of New York City, its use would tend to cause the model to predict maximum impacts close to each facility. Modeling without downwash will likely allow the plumes from two or more facilities to travel far enough to merge. The EPA agrees that these are reasonable assumptions in this case.

7.3.1.5. Modeling Parameter: Emissions

The EPA's Modeling TAD notes that for the purpose of modeling to characterize air quality for use in designations, the recommended approach is to use the most recent 3 years of actual emissions data and concurrent meteorological data. However, the TAD also indicates that it would be acceptable to use allowable emissions in the form of the most recently permitted (referred to as PTE or allowable) emissions rate that is federally enforceable and effective.

The EPA believes that continuous emissions monitoring systems (CEMS) data provide acceptable historical emissions information, when they are available. These data are available for many electric generating units. In the absence of CEMS data, the EPA's Modeling TAD highly encourages the use of AERMOD's hourly varying emissions keyword HOUREMIS, or through the use of AERMOD's variable emissions factors keyword EMISFACT. When choosing one of these methods, the EPA recommends using detailed throughput, operating schedules, and emissions information from the impacted source(s).

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. For example, where a facility has recently adopted a new federally enforceable emissions limit or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

As previously noted, New York included the New York City Power Stations within 50 km in the area of analysis. For this area of analysis, the State has opted to use a hybrid approach, where

emissions from certain facilities are expressed as actual emissions, and those from other facilities are expressed as PTE rates. The facilities in the State's modeling analysis and their associated actual or PTE rates are summarized below.

For Consolidated Edison – 74th Street Station, Consolidated Edison – East River Generating Station, Astoria Generating Station, and Ravenswood Generating Station, New York provided annual actual SO_2 emissions between 2013 and 2015. This information is summarized in Table 19. A description of how the State obtained hourly emission rates is given below this table.

Table 19. Actual SO_2 Emissions Between 2013 – 2015 from Facilities in the Area of Analysis for the New York County and Queens County Area

	SO_2 Emissions (tpy)		
Facility Name	**2013**	**2014**	**2015**
Consolidated Edison – 74th Street Station	335	76	86
Consolidated Edison – East River Generating Station	69	165	156
Astoria Generating Station	63	218	73
Ravenswood Generating Station	158	296	89
Total Emissions from All Facilities in the Area of Analysis Modeled Based on Actual Emissions	625	755	404

For Consolidated Edison – 74th Street Station, Consolidated Edison – East River Generating Station, Astoria Generating Station, and Ravenswood Generating Station, the actual hourly emissions data were obtained from the EPA's Clean Air Markets Division (CAMD) website.

For Consolidated Edison – 59th Street Station, the State provided PTE values. This information is summarized in Table 20. A description of how New York obtained hourly emission rates is given below this table.

Table 20. SO_2 Emissions based on short term allowable PTE from Facilities in the Area of Analysis for the New York County and Queens County Area

Facility Name	**SO_2 Emissions (tpy, based on short term PTE)**
Consolidated Edison – 59th Street Station	243
Total Emissions from Facilities in the Area of Analysis Modeled Based on PTE	243

The short term PTE in tons per year for Consolidated Edison – 59th Street Station was determined by New York based on the boiler heat rate (found in the NYSDEC title V permit[25]) and the sulfur content within the Number 6 oil, which was permitted at 0.3%. Since typically facilities don't operate at allowable continuously and simultaneously, it was likely overestimated

[25] New York's Title V permit (effective 5/07/14) is available at http://www.dec.ny.gov/dardata/boss/afs/permits/262020003200013_r2.pdf

that the facility operated 100 percent of the time, all year round. The maximum hourly emission was used in the modeling analysis. Emissions were assumed to be the same in each modeled year.

The EPA finds that New York appropriately used a hybrid of 3 years of actual hourly emissions for four facilities and PTE rates for the fifth facility in the model analysis in accordance with the SO_2 Modeling TAD.

7.3.1.6. Modeling Parameter: Meteorology and Surface Characteristics

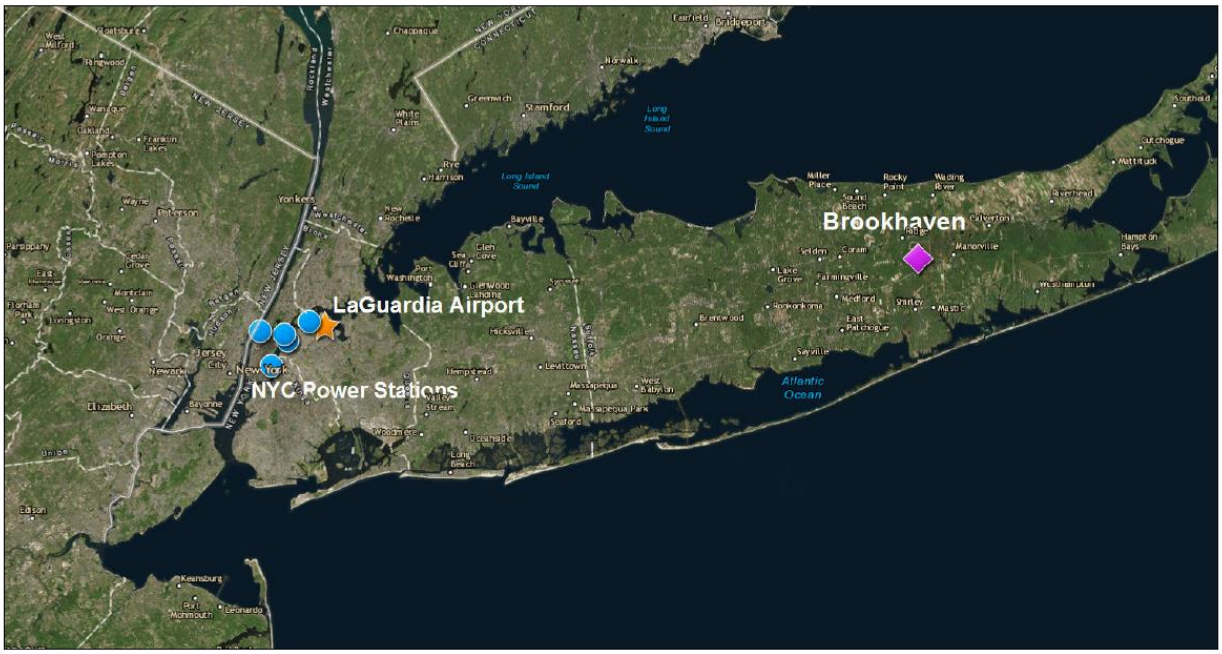
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of the data is determined based on: 1) the proximity of the meteorological monitoring site to the area under consideration, 2) the complexity of terrain, 3) the exposure of the meteorological site, and 4) the period of time during which data are collected. Sources of meteorological data include National Weather Service (NWS) stations, site-specific or onsite data, and other sources such as universities, Federal Aviation Administration (FAA), and military stations.

For the area of analysis for the New York City Area, New York selected the surface meteorology from LaGuardia International Airport (LGA), the NWS station in Queens, New York, located at 40.779N, 73.881W, about 3 km east of Astoria Generating Station, and coincident upper air observations from the NWS station at Brookhaven/Upton (OKX), New York, located at 40.867N, 72.867W, about 90 km east of Astoria Generating Station, as best representative of meteorological conditions within the area of analysis.

New York used AERSURFACE version 13016 using data from LaGuardia International Airport to estimate the surface characteristics (albedo, Bowen ratio, and surface roughness [z_o]) of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as "z_o." For this analysis, the 1-km radius circular area centered at the meteorological station site was divided into 12 equal 30-degree sectors for the surface roughness. The Bowen ratio and albedo are based on a 10 x 10 km grid, also centered at the meteorological tower. For the Bowen ratio calculations, AERSURFACE guidance dictates the land use values can be linked to three categories of surface moisture corresponding to average, wet, and dry conditions, depending on the site and meteorological data period. For LGA, normal surface moisture is 44.73 inches. The moisture is 82.1%, 85.6%, and 112.5% of normal for 2012, 2013, and 2014, respectively. Hence, the "average" surface moisture option for each month and season that is specified in the AERSURFACE users guide was used since it is representative of the location.

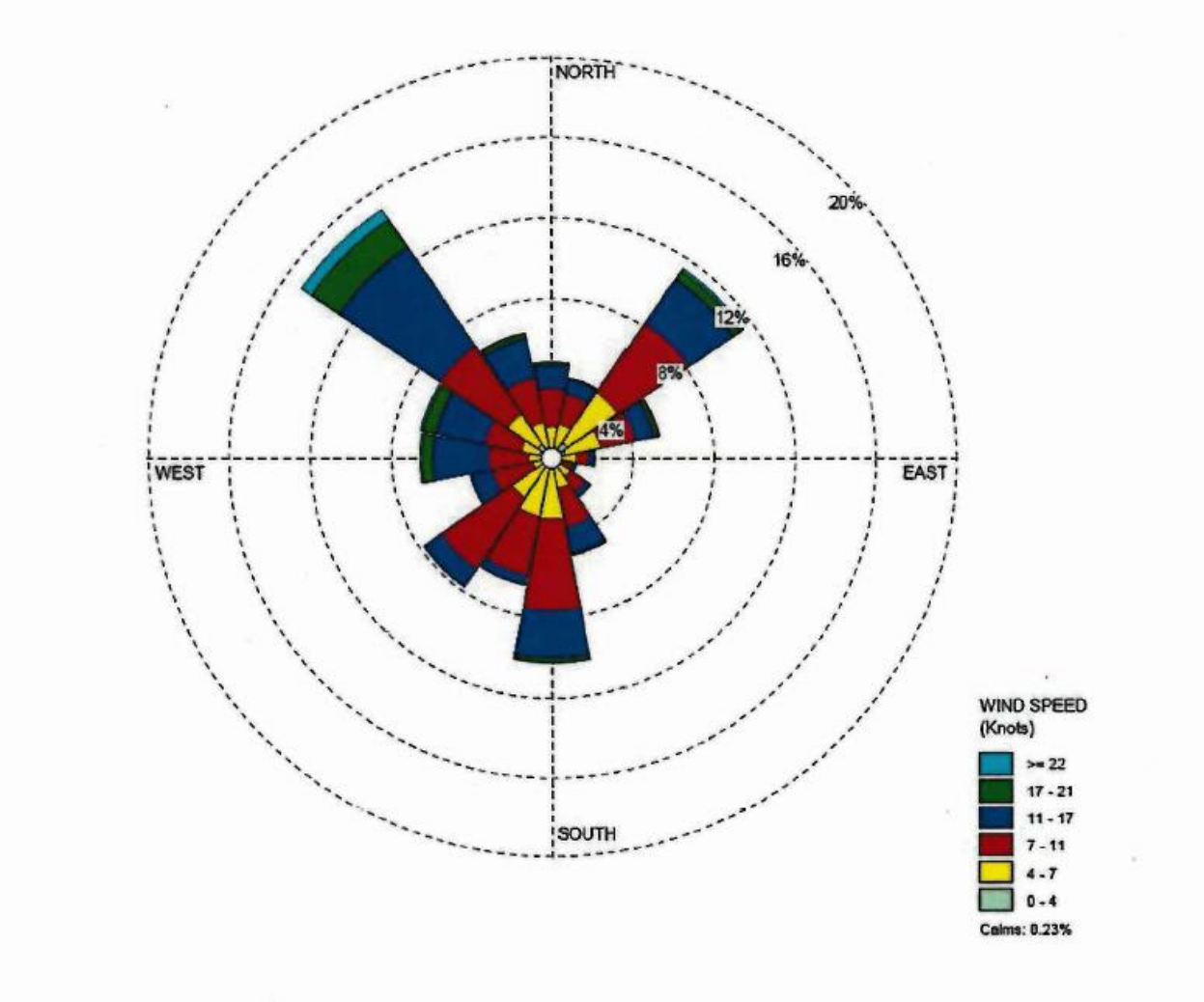
In the figure below, generated by the EPA, the locations of these NWS stations are shown relative to the area of analysis.

Figure 32. Area of Analysis and the NWS stations in the New York City Area



As part of its recommendation, New York provided the 3-year surface wind rose for LaGuardia International Airport. In Figure 33, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. While the figure shows winds from all directions, the predominant wind direction is from the northwest with calms occurring 0.23 percent of the time.

Figure 33: New York City Area Cumulative Annual Wind Rose for Years 2013 – 2015



Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET version 15181 processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. New York followed the methodology and settings presented in EPA's Guidance on Air Quality Models (40 CFR Appendix W) and NYSDEC's Air Modeling Procedures as outlined in DAR-10 / NYSDEC Guidelines on Dispersion Modeling Procedures for Air Quality Impact Analysis, modified by the SO_2 NAAQS Designation Modeling Technical Assistance Document (Modeling TAD), where applicable, in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

Hourly surface meteorological data records are read by AERMET, and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of 1-minute duration was provided from the first-order NWS station mentioned above, but in a different formatted file to be processed by a separate preprocessor, AERMINUTE version 15272 . These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration estimates. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, New York set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the 1-minute wind data.

The EPA agrees that the selected meteorological data is appropriate in this case since it is representative of the area. The EPA also agrees that the data was appropriately preprocessed using AERMINUTE, AERSURFACE and AERMET. The wind rose illustrates the predominant wind features of the modeled area.

7.3.1.7. Modeling Parameter: Geography, Topography (Mountain Ranges or Other Air Basin Boundaries) and Terrain

The terrain in the area of analysis is best described as gently rolling. To account for these terrain changes, the AERMAP version 11103 terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the USGS National Elevation Database. The EPA agrees the AERMAP preprocessor was appropriately applied by New York in this case in order to simulate the surrounding terrain.

7.3.1.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the State chose the tier 1 approach. As mentioned in Section 7.2, there are three SO_2 monitors relatively close to the five generating stations in the area of analysis. They are: New York Botanical Garden (Pfizer Lab), Intermediate School (IS) 52, and Queens College 2. The closest monitor to the area of analysis is IS 52, about 3.5 km north of Astoria Generating Station. However, to be account for the maximum impact in the New York area, the highest background value from the three SO_2 monitors in the area, which occurred at the New York Botanical Garden site (AQS ID #36-05-0133), was used. The single value of the background concentration for this area of analysis was determined by the State to be 41.40 micrograms per cubic meter ($\mu g/m^3$), equivalent to 15.8 ppb when expressed in 3 significant figures,[26] and that value was incorporated into the final AERMOD results.

The EPA agrees with New York's approach of including background concentration in the air quality analysis of the 1-hour SO_2 NAAQS (i.e., the use of the design value measured at the ambient monitor stated above.) The ambient monitors are representative of the contribution of background sources in the New York County and Queens County area.

7.3.1.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the New York County and Queens County area of analysis are summarized below in Table 21.

[26] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in $\mu g/m^3$. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 $\mu g/m^3$.

Table 21: Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the New York City Area

Input Parameter	Value
AERMOD Version	15181 (regulatory options)
Dispersion Characteristics	Urban (zopulation: 8 million
Modeled Sources	5
Modeled Stacks	17
Modeled Structures	0
Modeled Fencelines	0
Total receptors	12,401
Emissions Type	Mixed/Hybrid of Actual/PTE
Emissions Years	2013-2015
Meteorology Years	2013-2015
NWS Station for Surface Meteorology	LaGuardia International Airport (LGA)
NWS Station Upper Air Meteorology	Brookhaven/Upton (OKX)
NWS Station for Calculating Surface Characteristics	LaGuardia International Airport (LGA)
Methodology for Calculating Background SO_2 Concentration	New York Botanical Garden (Pfizer Lab) Monitor (AQS ID #36-050-133) Tier 1 based on 2013-15 DV
Calculated Background SO_2 Concentration	15.8 ppb or 41.40 $\mu g/m^3$

The results presented below in Table 22 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

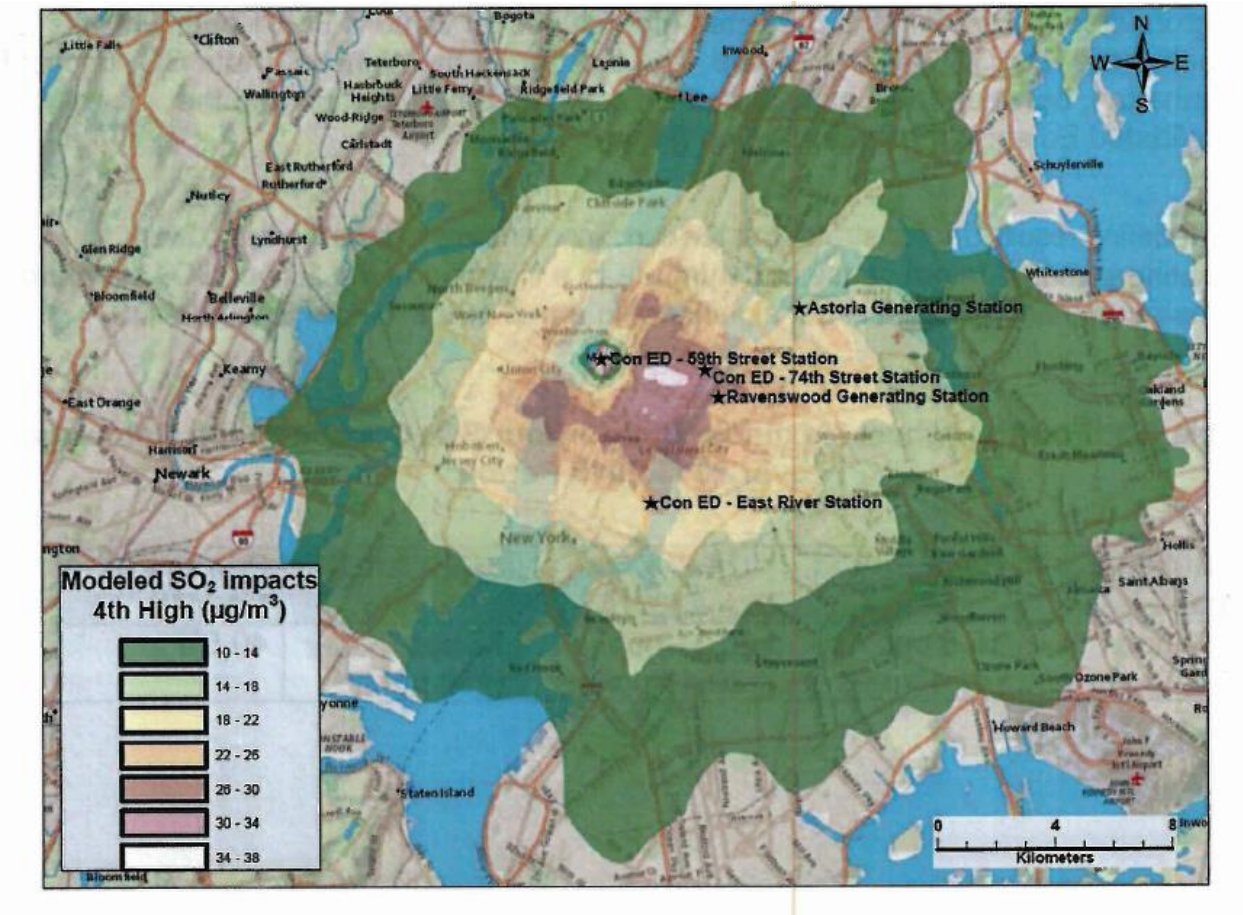
Table 22. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration for the Area of Analysis for the New York County and Queens County Area

		Receptor Location [UTM zone 18N]		**99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)**	
Averaging Period	**Data Period**	**UTM Easting**	**UTM Northing**	**Modeled concentration (including background)**	**NAAQS Level**
99th Percentile 1-Hour Average	2013-2015	586908.98 m	4513349.55 m	79.41	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 $\mu g/m^3$ conversion factor

New York's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 79.41 µg/m^3, equivalent to 30.32 ppb. This modeled concentration included the background concentration of SO_2, and is based on a mixture of actual and PTE emissions from the facilities. Figure 34 below was included as part of the State's recommendation and indicates that the predicted value occurred in Manhattan, between the Consolidated Edison – 59th Street Station and the Consolidated Edison – 74th Street Station.

Figure 34: Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the New York County and Queens County Area



The modeling submitted by New York does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration.

7.3.1.10. The EPA's Assessment of the Modeling Information Provided by the State

Based on the information provided by New York and summarized in this section, we conclude that the State: adequately examined and characterized sources within the area of analysis; appropriately placed receptors in the modeling domain; appropriately initialized and accounted for modeled emission sources; correctly selected meteorological sites and properly processed the data; adequately estimated surface characteristics; and, appropriately calculated background concentrations of SO_2 to add to modeled design values. We also agree with New York not including downwash in their modeling, which may not be accurately simulated in a dense urban environment of New York City, and would tend to cause the model to predict maximum impacts close to each facility. Based on this assessment, we conclude the modeling provided by the State accurately characterizes air quality in the area of analysis.

7.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the New York City Area

These factors have been incorporated into the air quality modeling efforts and results discussed above. The EPA is giving consideration to these factors by considering whether they were properly incorporated and by considering the air quality concentrations predicted by the modeling.

7.5. Jurisdictional Boundaries in the New York City Area

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for New York, Queens, Bronx, Kings, and Richmond Counties. The EPA's goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

New York recommended that the EPA designate the entirety of New York County, Queens County, Bronx County, Kings County, and Richmond County as attainment. New York referenced EPA's March 20, 2015, guidance that indicated county boundaries may be appropriate for defining attainment areas in the absence of any other information that would help define a more specific boundary around the SO_2 sources in question. The boundaries of New York, Queens, Bronx, Kings, and Richmond Counties are well established and well known.

7.6. Other Information Relevant to the Designations for the New York City Area

The EPA has received no third party modeling for this area. The EPA does not have any other relevant information.

7.7. The EPA's Assessment of the Available Information for the New York County and Queens County Area

The modeling analysis submitted by New York to characterize air quality in the area surrounding the 5 power stations in New York and Queens Counties indicates no violations of the 2010 SO_2 NAAQS or contributions to nearby nonattainment areas. As discussed above, we conclude the modeling provided by the State accurately characterizes air quality in the area of analysis. Monitoring data were available to EPA for consideration in the designations process, however, since it is unclear if these monitors are located in areas of maximum concentration, it is unclear if the data are representative of the area's actual air quality.

For New York, Queens, Bronx, Kings, and Richmond Counties, the EPA believes that a full county designation (rather than a partial county designation) of unclassifiable/attainment is appropriate. The receptor grid includes not only New York, and Queens, but completely covers the adjacent counties of the Bronx and Kings. Richmond County is almost completely covered by the receptor grid, except for a very small section of the residential neighborhood of Tottenville.

There are no other DRR sources in any of these counties. There are multiple smaller point sources, and two moderately sized point sources in the New York City area. In Queens County, the two moderately sized sources are Kennedy Airport, which emitted 440 tons in 2014, and LaGuardia Airport, which emitted 2016 tons in 2014. Also in Queens are eleven smaller point sources, each emitting 12 tons or less annually. In New York County, there are 12 point sources emitting under 40 tons annually. In Bronx County, there are 9 point sources emitting under 35 tons annually. Finally, in Kings County, there are 6 point sources emitting under 10 tons annually.

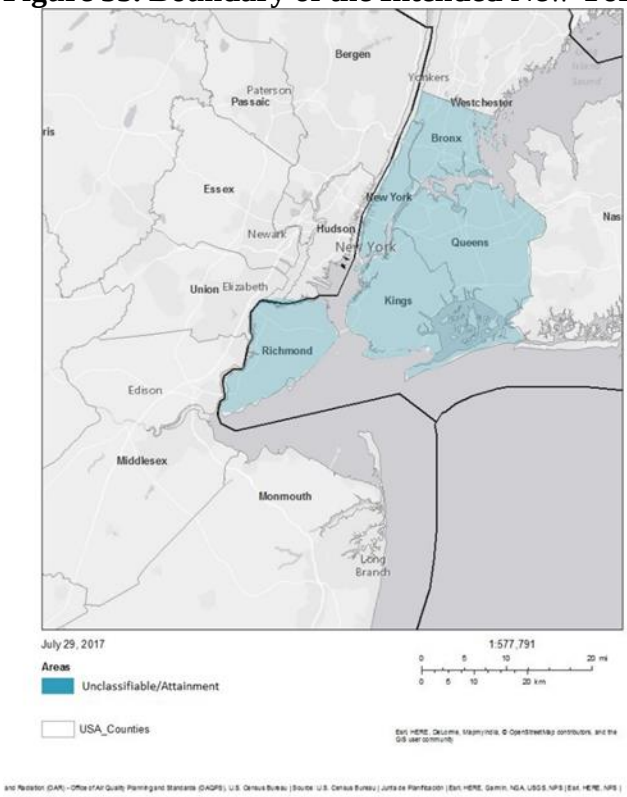
The monitors located in New York City, which are located in the Bronx and Queens, are unlikely to be sited in the area of the maximum 1-hour SO_2 concentration predicted by the models. The modeling of the five power stations, which were modeled with combined emissions of 463 tons/year, did not show any violations and was less than 50% of the NAAQS. Except for Kennedy Airport, which had similar emissions to the five power stations when combined, it is possible that any modeled impact could be expected to be below the NAAQS.

The EPA believes that our intended unclassifiable/attainment area, bounded by the borders of the county of New York, Queens, Kings, Bronx, and Richmond Counties will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area.

7.8. Summary of Our Intended Designation for the New York City

After careful evaluation of New York's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate New York, Queens, Bronx, Kings, and Richmond Counties as unclassifiable/attainment for the 2010 SO_2 NAAQS because, based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined the area (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS. Specifically, the boundaries are comprised of the borders of New York, Queens, Bronx, Kings, and Richmond Counties. Figure 35 shows the boundary of this intended designated area.

Figure 35. Boundary of the Intended New York City Unclassifiable/Attainment Area



At this time, our intended designations for New York only apply to this area and the other areas presented in this technical support document. The EPA intends in a separate action to evaluate and designate all remaining undesignated areas in New York by December 31, 2020.

8. Technical Analysis for the Remainder of New York (With the exception of Seneca, St. Lawrence, Tompkins, and Cayuga Counties)

8.1 Introduction

New York has not installed and begun timely operation of a new, approved SO_2 monitoring network meeting EPA specifications referenced in the EPA's DRR for any sources of SO_2 emissions in the counties identified in Table 23. Accordingly, the EPA must designate these counties by December 31, 2017. At this time, there are no air quality modeling results available to the EPA for these counties. In addition, there is no air quality monitoring data that indicate any violation of the 1-hour SO_2 NAAQS. The EPA is designating the counties in Table 23 in the State as "unclassifiable/attainment" since these areas were not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.

Table 23. Other Counties that the EPA Intends to Designate Unclassifiable/Attainment

County	New York's Recommended Area Definition	New York's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Allegany	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Broome	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Cattaraugus	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Chautauqua	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Chemung	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Chenango	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Clinton	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Columbia	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Cortland	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Delaware	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Dutchess	Entire County	Attainment	Same as state's	Unclassifiable/Attainment

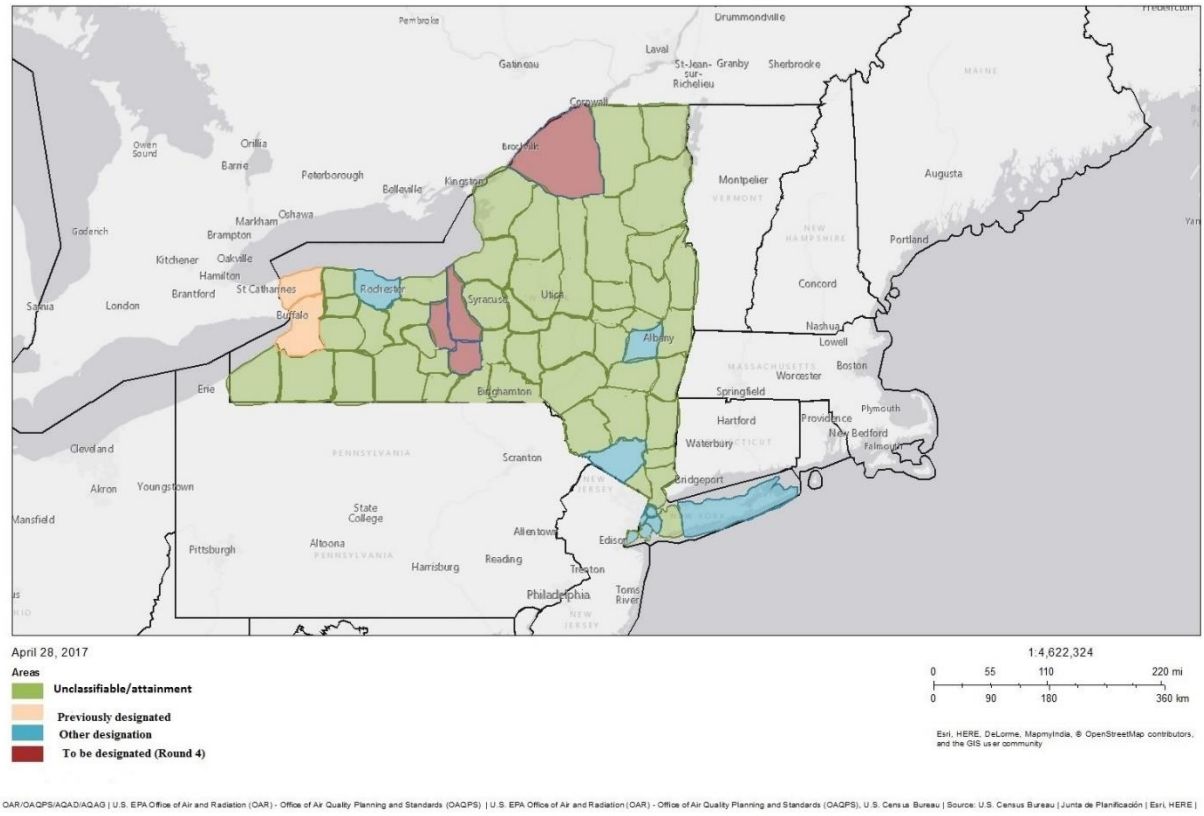
County	New York's Recommended Area Definition	New York's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Essex	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Franklin	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Fulton	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Genesee	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Greene	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Hamilton	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Herkimer	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Jefferson	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Lewis	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Livingston	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Madison	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Montgomery	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Nassau	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Oneida	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Onondaga	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Ontario	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Orleans	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Oswego	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Otsego	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Putnam	Entire County	Attainment	Same as state's	Unclassifiable/Attainment

County	New York's Recommended Area Definition	New York's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Rensselaer	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Rockland	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Saratoga	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Schenectady	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Schoharie	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Schuyler	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Steuben	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Sullivan	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Tioga	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Ulster	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Warren	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Washington	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Wayne	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Westchester	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Wyoming	Entire County	Attainment	Same as state's	Unclassifiable/Attainment
Yates	Entire County	Attainment	Same as state's	Unclassifiable/Attainment

Table 23 also summarizes New York's recommendations for these areas. Specifically, the State recommended in their January 4, 2017, letter that the entirety of the counties in the above Table 23 be designated as attainment. New York's basis for their recommendation included air monitors measuring below the NAAQS of 75 ppb.

After careful review of the State's assessment, supporting documentation, and all available data, the EPA agrees with the state's recommendation and intends to designate each of these counties as a separate unclassifiable/attainment area. Figure 36 shows the locations of these areas within New York.

Figure 36. The EPA's Intended Unclassifiable/Attainment Designations for Certain Other Counties in New York



As referenced in the introduction (see Table 2), the counties associated with sources for which New York has installed and begun timely operation of a new, approved SO_2 monitoring network are required to be designated by December 31, 2020, but are not being addressed at this time. Counties previously designated unclassifiable in Round 1 (*see* 78 *Federal Register* 4719) and Round 2 (s*ee* 81 *Federal Register* 45039) will remain unchanged unless otherwise noted.

8.2 Air Quality Monitoring Data for the Remainder of the New York Counties

Data collected at the SO_2 air monitors listed in Table 24 below have sufficient valid data in AQS and indicate that there were no violations of the 2010 SO_2 NAAQS according to the most recent 2014-2016 design values. All values are below the NAAQS. These data were available to EPA for consideration in the designations process, however, since it is unclear if these monitors are located in areas of maximum concentration, it is unclear if the data are representative of the area's actual air quality.

Table 24: Air Quality Data

County	Monitor	AQS ID	2011-2013 SO_2 Design Value (ppb)	2012-2014 SO_2 Design Value (ppb)	2013-2015 SO_2 Design Value (ppb)	2014-2016 SO_2 Design Value (ppb)
Chautauqua	Dunkirk	36-013-0006	22	18	17	13
Dutchess	Millbrook	36-027-0007	7	6	5	5
Essex	Whiteface Base	36-031-0003	4	3	3	4
Franklin	Paul Smiths	36-033-0004	4	3	3	3
Hamilton	Piseco Lake	36-041-0005	4	3	4	3
Herkimer	Nicks Lake	36-043-0005	4	4	4	4
Nassau	Eisenhower Park	36-059-0005	NV[27]	NV	NV	7
Onondaga	East Syracuse	36-067-1015	7	6	5	4
Putnam	Mt. Ninham	36-079-0005	8	6	6	5
Steuben	Pinnacle State Park	36-101-0003	10	9	9	8

New York emphasized the monitored design values for the counties listed in Table 24 as a rationale for a designation recommendation of attainment for those counties. New York also noted in their January 4, 2017 submission to the EPA that the air monitor in Chautauqua County near the Dunkirk Generating Station was attaining the NAAQS while the Dunkirk Generating Station was still operating. The Dunkirk facility has been inactive since January 2016.

New York also indicated that Essex County should be designated attainment based partly on a then preliminary 2014-2016 design value of 4 ppb, which has since been finalized, as well as a 2013-2015 design value of 9 ppb for a nearby monitor in Rutland, Vermont. The Vermont monitor is 26 miles southeast of the only point source in Essex County (International Paper, which emitted 1,087 tons of SO_2 in 2014).

[27] No valid (NV) design value due to incomplete data.

Air monitoring data collected at each of the New York air monitors above indicate SO_2 concentrations are below the NAAQS.

New York indicated that they evaluated monitoring data and SO_2 design value data for the states that border New York (i.e., Connecticut, Massachusetts, New Jersey, Pennsylvania, and Vermont), and that no sources in New York are contributing to a violation in any nearby area. New York further stated that Warren County, Pennsylvania, had been previously designated as nonattainment by the EPA. The most recent design value for the Warren County air monitor (from 2014-16) was violating the NAAQS at 92 ppb. New York indicated that in EPA's Technical Support Document[28] for the previous SO_2 nonattainment designation for Warren County, EPA stated that it, "is not prepared to find that any nearby areas contribute to the monitored violations in Warren county…Additionally, EPA is not prepared to conclude that…the large sources in neighboring counties are likely to impact the monitor in Warren County. The monitored violation is likely driven by the source within close proximity of the monitor (i.e., United Refining- Warren Plant)." New York further stated that the New York counties bordering Warren County, Pennsylvania, have decreased point source emissions since the nonattainment designation for Warren County. Cattaraugus County in New York currently emits less than 1 ton per year total in point source emissions for the entire county. The nearby Samuel A. Carlson Generating Station in Chautauqua County in New York, approximately 28 kilometers north of the violating Warren County monitor, no longer burns coal and reported SO_2 emissions of 0.63 tons in 2014 and 2015. The EPA notes that the Warren County 2009-2011 design value was 105 ppb. The Samuel A. Carlson Generating Station decreased its emissions from 1,885 tons of SO_2 in 2009 to 664 tons in 2011. The design value for Warren County has since increased to 92 ppb, while emissions from Samuel A. Carlson Generating Station have declined to less than 1 ton per year, which is further indicative that New York sources are not impacting the Warren County monitor.

Per this evaluation of emissions data, the EPA does not have available information that suggests that New York emission sources are impacting the violating monitor in Warren County, Pennsylvania.

8.3 Jurisdictional Boundaries for the Remainder of the New York Counties

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for the remainder of the New York Counties. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable. New York relied on county boundaries to define its recommended attainment areas.

[28] https://www.epa.gov/sites/production/files/2016-03/documents/pa-epa-tsd.pdf

8.4 The EPA's Assessment of the Available Information for the Remainder of the New York Counties

These counties were not required to be characterized under 40 CFR 51.1203(c) or (d) and EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS. These counties therefore meet the definition of an "unclassifiable/attainment" area.

Our intended unclassifiable/attainment areas, bounded by the borders of the counties listed in Table 23, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment areas.

8.5 Summary of Our Intended Designation for the Remainder of the New York Counties

After careful evaluation of the State's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the remainder of the New York Counties (with the exception of Seneca, St. Lawrence, Tompkins, and Cayuga Counties, which will be designated in Round 4) as unclassifiable/attainment for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the borders of the counties listed in Table 23, above. Figure 36 shows the location of these areas within New York.

At this time, our intended designations for the state only apply to these areas and the other areas presented in this chapter. The EPA intends to evaluate and designate all remaining undesignated areas in New York by December 31, 2020.