Technical Support Document

New York
Area Designations for the 2010 SO_2 Primary National Ambient Air Quality Standard

Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA, or the Agency) must designate areas as either "unclassifiable," "attainment," or "nonattainment" for the 2010 one-hour sulfur dioxide (SO_2) primary national ambient air quality standard (NAAQS). The CAA defines a nonattainment area as one that does not meet the NAAQS or that contributes to a violation in a nearby area. An attainment area is defined as any area other than a nonattainment area that meets the NAAQS. Unclassifiable areas are defined as those that cannot be classified on the basis of available information as meeting or not meeting the NAAQS.

New York submitted updated recommendations on September 18, 2015, ahead of a July 2, 2016, deadline for the EPA to designate certain areas established by the U.S. District Court for the Northern District of California. This deadline is the first of three deadlines established by the court for the EPA to complete area designations for the 2010 SO_2 NAAQS. Table 1 below lists New York's recommendations and identifies the counties or portions of counties in New York that the EPA intends to designate by July 2, 2016 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: New York's Recommended and EPA's Intended Designations

Area	New York's Recommended Area Definition	New York's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Erie - Niagara, NY	Erie County, Niagara County, Cattaraugus County	Attainment	Erie County, Niagara County	Unclassifiable/ Attainment

Background

On June 3, 2010, the EPA revised the primary (health based) SO_2 NAAQS by establishing a new one-hour standard at a level of 75 parts per billion (ppb) which is attained when the three-year average of the 99th percentile of one-hour daily maximum concentrations does not exceed 75 ppb. This NAAQS was published in the Federal Register on June 22, 2010 (75 FR 35520) and is codified at 40 CFR 50.17. The EPA determined this is the level necessary to protect public health with an adequate margin of safety, especially for children, the elderly and those with asthma. These groups are particularly susceptible to the health effects associated with breathing SO_2. The two prior primary standards of 140 ppb evaluated over 24 hours, and 30 ppb evaluated over an

entire year, codified at 40 CFR 50.4, remain applicable.[1] However, the EPA is not currently designating areas on the basis of either of these two primary standards. Similarly, the secondary standard for SO_2, set at 500 ppb evaluated over 3 hours has not been revised, and the EPA is also not currently designating areas on the basis of the secondary standard.

General Approach and Schedule

Section 107(d) of the Clean Air Act requires that not later than one year after promulgation of a new or revised NAAQS, state governors must submit their recommendations for designations and boundaries to EPA. Section 107(d) also requires the EPA to provide notification to states no less than 120 days prior to promulgating an initial area designation that is a modification of a state's recommendation. If a state does not submit designation recommendations, the EPA will promulgate the designations that it deems appropriate. If a state or tribe disagrees with the EPA's intended designations, they are given an opportunity within the 120 day period to demonstrate why any proposed modification is inappropriate.

On August 5, 2013, the EPA published a final rule establishing air quality designations for 29 areas in the United States for the 2010 SO_2 NAAQS, based on recorded air quality monitoring data from 2009 - 2011 showing violations of the NAAQS (78 FR 47191). In that rulemaking, the EPA committed to address, in separate future actions, the designations for all other areas for which the Agency was not yet prepared to issue designations.

Following the initial August 5, 2013 designations, three lawsuits were filed against the EPA in different U.S. District Courts, alleging the Agency had failed to perform a nondiscretionary duty under the CAA by not designating all portions of the country by the June 2013 deadline. In an effort intended to resolve the litigation in one of those cases, plaintiffs Sierra Club and the Natural Resources Defense Council and the EPA filed a proposed consent decree with the U.S. District Court for the Northern District of California. On March 2, 2015, the court entered the consent decree and issued an enforceable order for the EPA to complete the area designations according to the court-ordered schedule.

According to the court-ordered schedule, the EPA must complete the remaining designations by three specific deadlines. By no later than July 2, 2016 (16 months from the court's order), the EPA must designate two groups of areas: (1) areas that have newly monitored violations of the 2010 SO_2 NAAQS and (2) areas that contain any stationary sources that had not been announced as of March 2, 2015 for retirement and that according to the EPA's Air Markets Database emitted in 2012 either (i) more than 16,000 tons of SO_2 or (ii) more than 2,600 tons of SO_2 with an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units (lbs SO_2/mmBTU). Specifically, a stationary source with a coal-fired unit that as of January 1, 2010 had a capacity of over 5 megawatts and otherwise meets the emissions criteria, is excluded from the July 2, 2016 deadline if it had announced through a company public announcement, public utilities commission filing, consent decree, public legal settlement, final

[1] 40 CFR 50.4(e) provides that the two prior primary NAAQS will no longer apply to an area one year after its designation under the 2010 NAAQS, except that for areas designated nonattainment under the prior NAAQS as of August 22, 2010, and areas not meeting the requirements of a SIP Call under the prior NAAQS, the prior NAAQS will apply until that area submits and EPA approves a SIP providing for attainment of the 2010 NAAQS.

state or federal permit filing, or other similar means of communication, by March 2, 2015, that it will cease burning coal at that unit.

The last two deadlines for completing remaining designations are December 31, 2017, and December 31, 2020. The EPA has separately promulgated requirements for states and other air agencies to provide additional monitoring or modeling information on a timetable consistent with these designation deadlines. We expect this information to become available in time to help inform these subsequent designations. These requirements were promulgated on August 21, 2015 (80 FR 51052), in a rule known as the SO_2 Data Requirements Rule (DRR).

Updated designations guidance was issued by the EPA through 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. This memorandum supersedes earlier designation guidance for the 2010 SO_2 NAAQS, issued on March 24, 2011, and it identifies factors that the EPA intends to evaluate in determining whether areas are in violation of the 2010 SO_2 NAAQS. The guidance also contains the factors the EPA intends to evaluate in determining the boundaries for all remaining areas in the country, consistent with the court's order and schedule. 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. This guidance was supplemented by two technical assistance documents intended to assist states and other interested parties in their efforts to characterize air quality through air dispersion modeling or ambient air quality monitoring for sources that emit SO_2. Notably, the EPA released its most recent versions of documents titled, "SO_2 NAAQS Designations Modeling Technical Assistance Document" (Modeling TAD) and "SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document" (Monitoring TAD) in December 2013.

For the State of New York, based on ambient air quality data collected between 2012 and 2014, no violations of the 2010 SO_2 NAAQS have been recorded in any undesignated part of the State.[2] However, there are two sources in the State meeting the emissions criteria of the consent decree for which the EPA must complete designations by July 2, 2016. In this draft technical support document, the EPA discusses its review and technical analysis of New York's updated recommendations for the areas that we must designate. The EPA also discusses any intended modifications from the State's recommendation based on all available data before us.

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

[2] For designations based on ambient air quality monitoring data that violates the 2010 SO_2 NAAQS, the consent decree directs the EPA to evaluate data collected between 2013 and 2015. Absent complete, quality assured and certified data for 2015, the analyses of applicable areas for the EPA's intended designations will be informed by data collected between 2012 and 2014. States with monitors that have recorded a violation of the 2010 SO_2 NAAQS during these years have the option of submitting complete, quality assured and certified data for calendar year 2015 by April 19, 2016 to the EPA for evaluation. If after our review, the ambient air quality data for the area indicates that no violation of the NAAQS occurred between 2013 and 2015, the consent decree does not obligate the EPA to complete the designation. Instead, we may designate the area and all other previously undesignated areas in the state on a schedule consistent with the prescribed timing of the court order, i.e., by December 31, 2017, or December 31, 2020.

1) 2010 SO_2 NAAQS – The primary NAAQS for SO_2 promulgated in 2010. This NAAQS is 75 ppb, based on the three year average of the 99th percentile of the annual distribution of daily maximum one-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 which the EPA has determined has violated the 2010 SO_2 NAAQS or contributed to a violation in a nearby area. A nonattainment designation reflects considerations of state recommendations and all of the information discussed in this document. The EPA's decision is based on all available information including the most recent 3 years of air quality monitoring data, available modeling analysis, and any other relevant information.
4) Designated unclassifiable area – an area which the EPA cannot determine based on all available information whether or not it meets the 2010 SO_2 NAAQS.
5) Designated unclassifiable/attainment area – an area which the EPA has determined to have sufficient evidence to find either is attaining or is likely to be attaining the NAAQS. The EPA's decision is based on all available information including the most recent 3 years of air quality monitoring data, available modeling analysis, and any other relevant information.
6) Modeled violation – a violation based on air dispersion modeling.
7) Recommended attainment area – an area a state or tribe has recommended that the EPA designate as attainment.
8) Recommended nonattainment area – an area a state or tribe has recommended that the EPA designate as nonattainment.
9) Recommended unclassifiable area – an area a state or tribe has recommended that the EPA designate as unclassifiable.
10) Recommended unclassifiable/attainment area – an area a state or tribe has recommended that the EPA designate as unclassifiable/attainment.
11) Violating monitor – an ambient air monitor meeting all methods, quality assurance and siting criteria and requirements whose valid design value exceeds 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.

Technical Analysis for the Erie - Niagara, NY Area

Introduction

The Erie-Niagara area contains two stationary sources that according to the EPA's Air Markets Database emitted in 2012 either more than 16,000 tons of SO_2, or more than 2,600 tons of SO_2 and had an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units (lbs SO_2/mmBTU). As of March 2, 2015, these stationary sources had not met the specific requirements for being "announced for retirement." Specifically, the Huntley Generating Station emitted 2,716 tons of SO_2 in 2012, and had an emissions rate of 0.70 lbs SO_2/mmBTU. In addition, the Somerset Generating Station emitted 5,653 tons of SO_2 in 2012, and had an emissions rate of 0.53 lbs SO_2/mmBTU. Pursuant to the March 2, 2015 court-ordered schedule, the EPA must designate the area surrounding these facilities by July 2, 2016.

In its submission, New York recommended that the area surrounding the Huntley and Somerset Generating Stations, specifically the entirety of Erie, Niagara, and Cattaraugus Counties, be designated as attainment based on an assessment and characterization of air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO_2 are expected. 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 does not agree entirely with the State's recommendation for the area, and intends to designate only Erie and Niagara Counties as unclassifiable/attainment.

The Huntley Generating Station is located in the northwestern portion of Erie County 10.5 km north-northwest of Buffalo, NY. The plant is on the shore of the Niagara River in the Town of Tonawanda, NY and can be seen in Figure 1 below. In addition, the Somerset Generating Station is located in Niagara County approximately 35 miles north-northeast of Buffalo, NY and 50 miles west-northwest of Rochester, NY. The plant is on the south shore of Lake Ontario and can be seen in Figure 2. Also included in the figures are nearby emitters of SO_2, the State's recommended area for the attainment designation, and the EPA's intended unclassifiable/attainment designation for the area.

Figure 1: The Huntley Generating Station, Erie County, New York

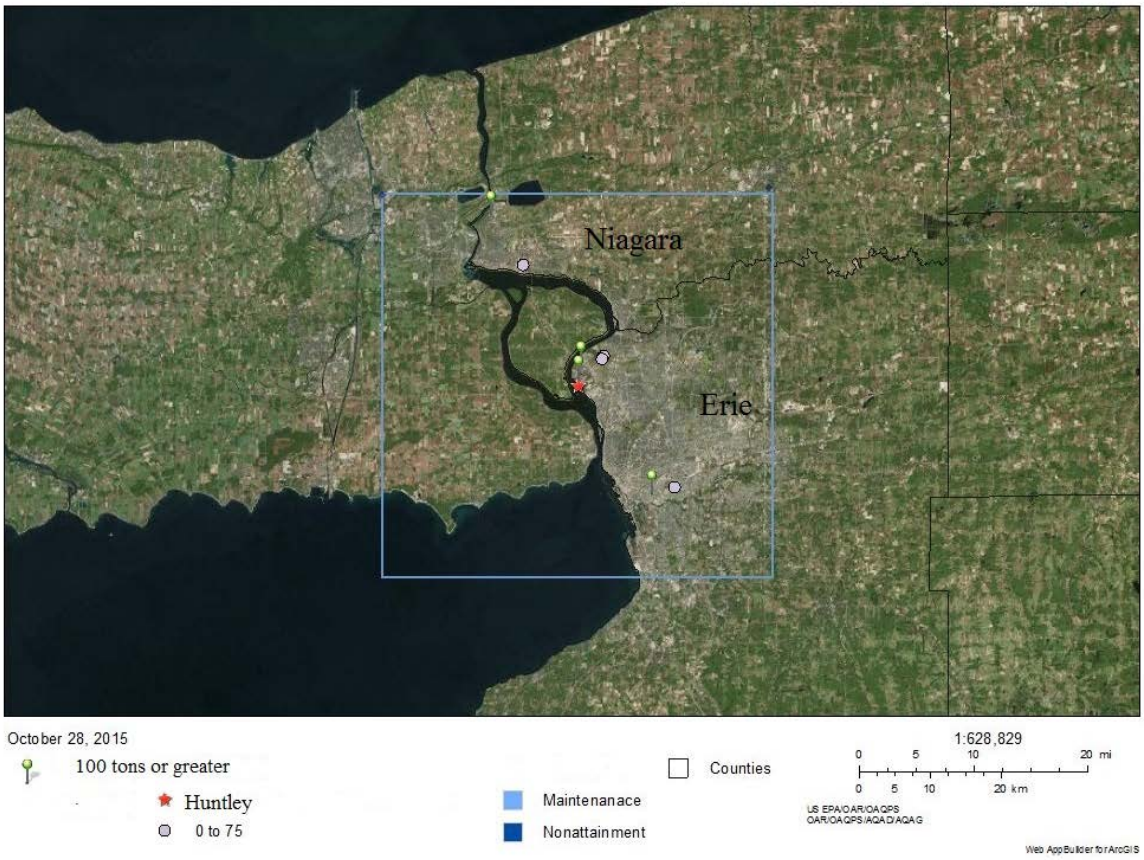
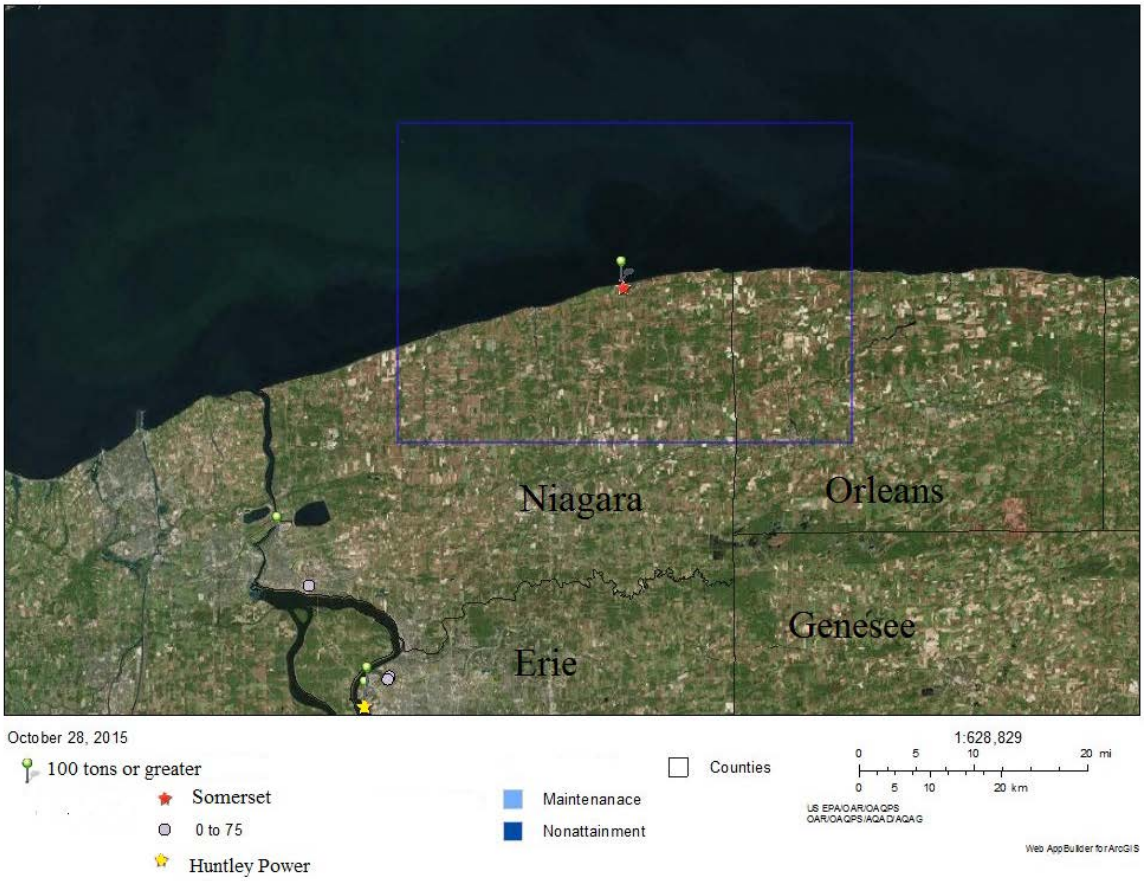


Figure 2: The Somerset Generating Station, Niagara County, New York



The discussion and analysis that follows below will reference the state's use of the Modeling TAD, the EPA's assessment of the state's modeling in accordance with the Modeling TAD, and the factors for evaluation contained in the EPA's March 20, 2015 guidance, as appropriate.

Detailed Assessment for Huntley Generating Station

Air Quality Data

This factor considers the SO_2 air quality monitoring data in the area surrounding Huntley Generating Station. The facility is located in Erie County, and the State included monitoring data from the Air Quality Systems monitor (Tonawanda - Brookside Terrace (or Tonawanda II) - monitor id - 360291014) closest to the facility in its recommendation. This monitor is located at 192 Brookside Terrace West, Buffalo, NY, in Erie County, and is approximately 3.2 km away from Huntley Generating Station. Data collected at this monitor indicates that SO_2 concentrations are well below the SO_2 NAAQS and have been trending downward. In addition, these data have been quality assured and are valid for comparison to the NAAQS. A summary of historical design values (DV) in ppb in is listed below in Table 2.

Table 2: Available Air Quality Data for the Area Closest to Huntley Generating Station

County	Air Quality Systems (AQS) Monitor ID	Monitor Location	Distance to Huntley Generating Station	'10 – '12 DV (ppb)	'11 – '13 DV (ppb)	'12 – '14 DV (ppb)
Erie	36-029-1014	192 Brookside Terrace West, Buffalo NY	3.2 km	29	25	22

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. In some instances the recommended model may be a model other than AERMOD, such as the BLP model for buoyant line sources. 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
- BPIPPRIME: 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 14134, and a discussion of the individual components will be referenced in the corresponding discussion that follows, as appropriate.

Modeling Parameter: Rural or Urban Dispersion

When performing the modeling for the area of analysis, the State determined that it was most appropriate to run the model in rural mode.

The State came to this conclusion by examining the land-use within 3 km of the facility. They analyzed the meteorological data using the AERSURFACE pre-processor. AERSURFACE uses land cover data from the National Land Cover Data (NCLD) 1992 database to determine the surface roughness, albedo, and Bowen ratio.

Modeling Parameter: Area of Analysis (Receptor Grid)

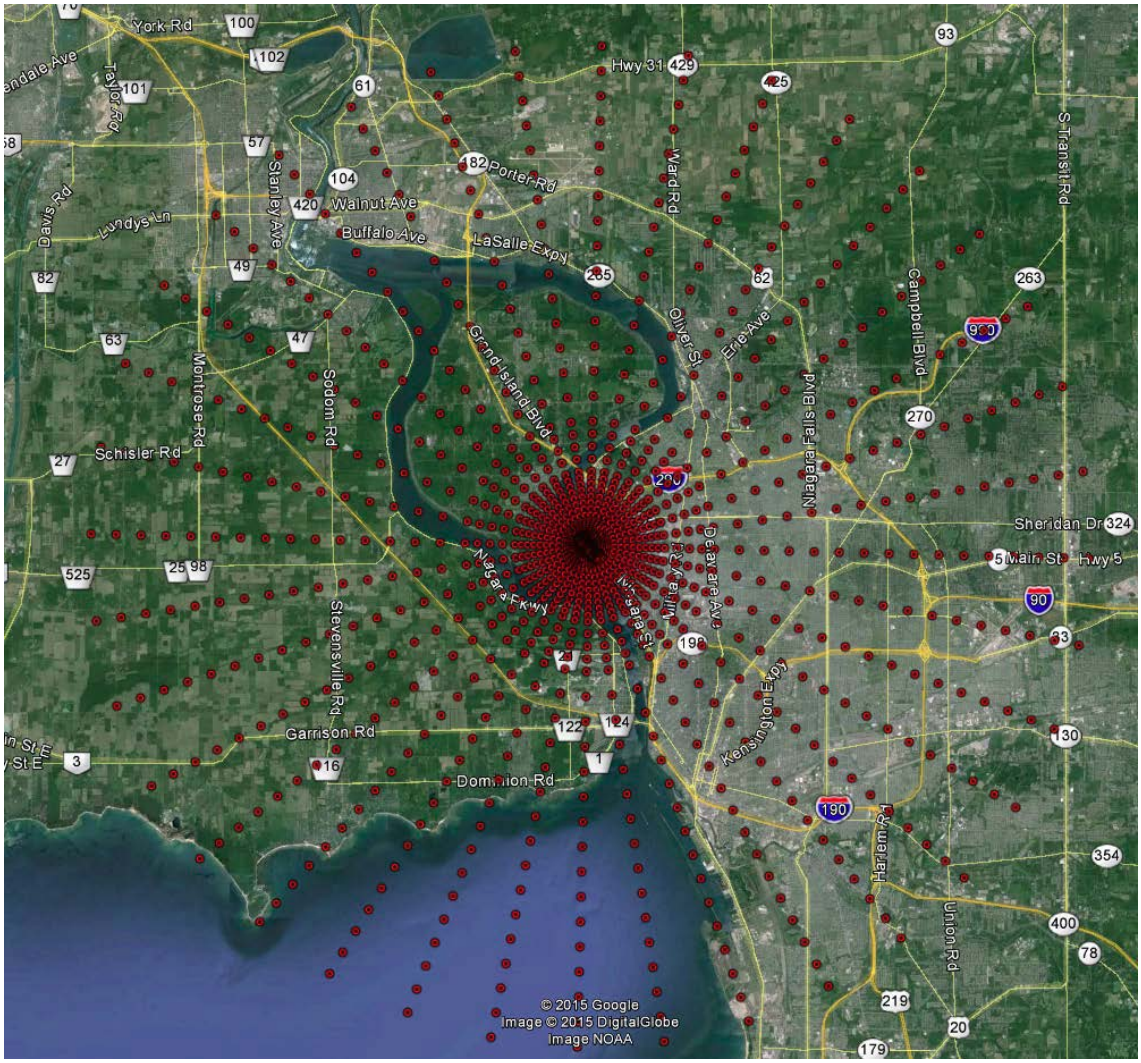
The EPA believes that a reasonable first step towards characterization of air quality in the area surrounding the Huntley Generating Station is to determine the extent of the area of analysis, i.e., receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations. For the area surrounding the Huntley Generating Station in the Erie - Niagara, NY area, the State used only ambient monitoring data along with the Huntley Generating Station modeling results since the ambient monitoring data, to a large degree, reflect the contributions from the other sources in the area.

- 100 m spacing from the source to 2km
- 250 m spacing from 2 km to 5 km
- 500 m spacing from 5 km to 10 km
- 1000 m spacing from 10 km to 20 km

Receptors were placed on 36 radials 10 degrees apart and the grid was centered on the emission source. Receptors within the Huntley fence line were eliminated and special receptor were placed along the fence line at every 25 m. The grid contained a total of 1369 receptors. While the EPA believes that with increasing distance, spatial resolution may diminish while using a polar grid (as opposed to Cartesian), since the maximum concentration from the facility was close in and was well below the NAAQS, we feel that this is acceptable.

Figure 3, included in the State's recommendation, shows the State's chosen area of analysis surrounding the Huntley Generating Station, as well as receptor grid for the area of analysis.

Figure 3: Huntley Area of Analysis



Consistent with the Modeling TAD, receptors for the purposes of this designation effort were placed only in areas where it would also be feasible to place a monitor and record ambient air impacts. The impacts of the area's geography and topography will be discussed later within this document.

Modeling Parameter: Source Characterization

The State characterized the source(s) 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. The AERMOD component BPIPPRIME was used to assist in addressing building downwash.

Modeling Parameter: Emissions

The EPA's Modeling TAD notes that for the purposes 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 does provide for the flexibility of using allowable emissions in the form of the most recently permitted (referred to as PTE or allowable) emissions rate.

The EPA believes that continuous emissions monitoring systems (CEMS) data provide acceptable historical emissions information, when it is available, and that 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 believes that detailed throughput, operating schedules, and emissions information from the impacted source(s) should be used.

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. Specifically, a facility may have recently adopted a new federally enforceable emissions limit, been subject to a federally enforceable consent decree, or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS. These new limits or conditions may be used in the application of AERMOD. In these cases, the Modeling TAD notes that the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations should contain the necessary emissions information for designations-related modeling. 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, the State only included ambient monitoring data along with the Huntley Generating Station for this analysis. In its recommendation, New York stated that because ambient monitored air quality data in the area already to a large degree reflect the contribution of Huntley and nearby sources to the SO_2 concentration, it was not necessary to include emissions from sources other than Huntley in the modeling. All of the available monitor data was used in calculating the seasonal/hourly background values, including the time periods when the nearby sources were impacting the monitor. As such, the modeled concentrations, which include seasonal/hourly 99th percentile background, can be expected to be highly conservative. Actual emissions data obtained from temporally variable rates for Huntley Generating Station between 2012 and 2014 are summarized in Table 3 below.

Table 3: Actual SO_2 Emissions between 2012 and 2014 from Facilities in the Erie - Niagara, NY Area of Analysis

Facility Name	SO_2 Emissions (tons per year)		
	2012	2013	2014
Huntley Generating Station	2,716	3,218	3,192

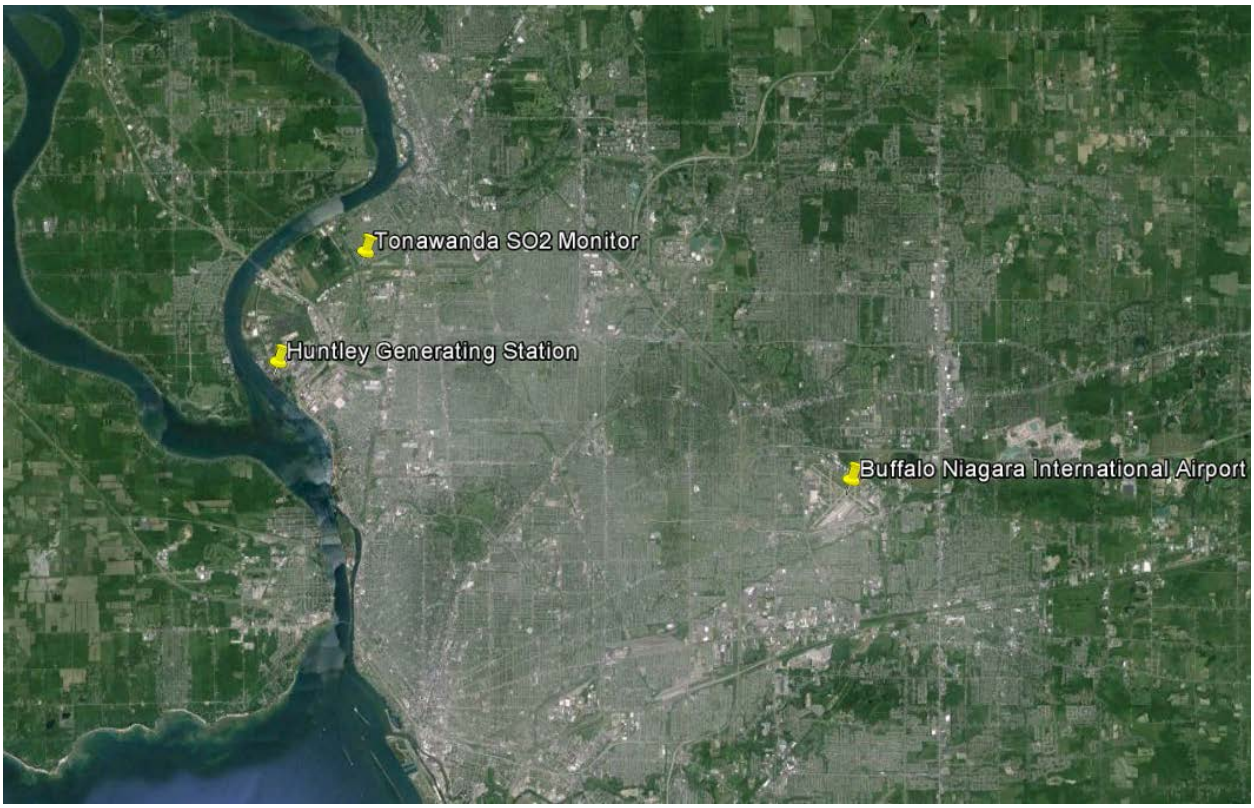
Modeling Parameter: Meteorology and Surface Characteristics

The most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. As noted in the Modeling TAD, the selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of the data are 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 Erie - Niagara, NY area of analysis, surface and upper air data were obtained from the Buffalo Niagara International Airport, approximately 16.5 km to the southeast, and were selected as best representative of meteorological conditions within the area of analysis.

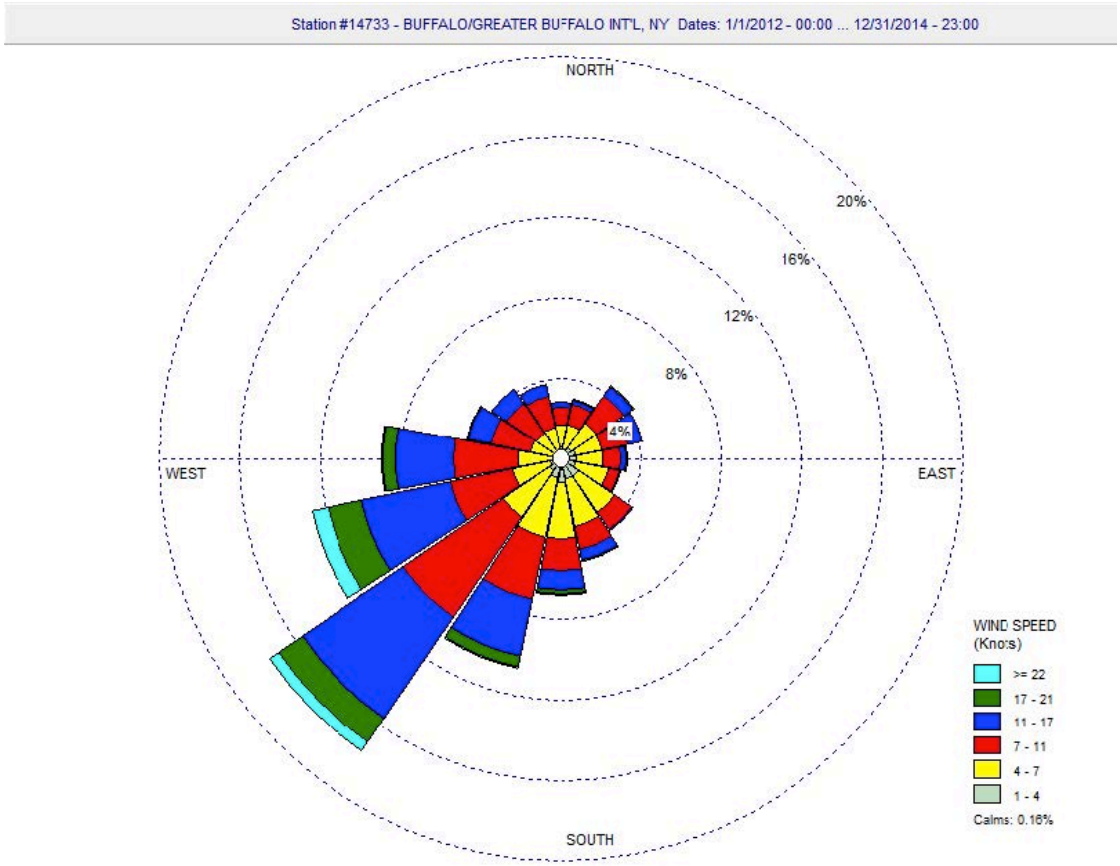
The State used AERSURFACE version 13016 using data from the Buffalo Niagara International Airport (located at 685258.87E, 4756637.93N) to estimate the surface characteristics of the area of analysis. The State estimated values for 360 degrees out to 1 km at a seasonal temporal resolution for average conditions. The State also estimated values for albedo (the fraction of solar energy reflected from the earth back into space), the Bowen ratio (the method generally used to calculate heat lost or heat gained in a substance), and the surface roughness (sometimes referred to as “Zo”). In Figure 4 below, included in the State’s recommendation, the location of the Buffalo Niagara International Airport station is shown relative to the Huntley Generating Station area of analysis.

Figure 4: Huntley Generating Station Area of Analysis and the Buffalo Niagara International Airport



As part of its recommendation, the State provided the 3-year surface wind rose for the Buffalo Niagara International Airport. In Figure 5, 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 southwest.

Figure 5: Buffalo Niagara International Airport Cumulative Annual Wind Rose (2012 – 2014)



Meteorological data from the above surface and upper air stations were used in generating AERMOD-ready files with the AERMET processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The State followed the methodology and settings presented in EPA's Guideline on Air Quality Models (40 CFR Appendix W) and DEC's Air Modeling Procedures as outlined in DAR-10 / NYSDEC Guidelines on Dispersion Modeling Procedures for Air Quality Impact Analysis, modified by the SO2 NAAQS Designations 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 one minute duration was provided from the same instrument tower, but in a different formatted file to

be processed by a separate preprocessor, AERMINUTE. 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. This approach is consistent with a March 2013 EPA memo titled, "Use of ASOS meteorological data in AERMOD dispersion Modeling." In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the one minute wind data.

Modeling Parameter: Geography and Terrain

The terrain in the area of analysis is best described as gently rolling. To account for these terrain changes, the AERMAP 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.

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 "first tier" approach, based on monitored design values, or 2) a temporally varying approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For the Huntley Generating Station area of analysis, the State chose this second approach. The hourly SO_2 data from the Tonawanda II monitor for the period 2012 – 2014 were processed to obtain 3-year averages of the 99th percentile concentrations by season and hour-of-day. The background concentrations for this area of analysis varied by wind direction and wind speed and were incorporated into the final AERMOD results. New York acknowledges that the modeled concentrations can be expected to be highly conservative but should not have a major impact on the final design value.

Summary of Modeling Results

The AERMOD modeling parameters for the Huntley Generating Station area of analysis are summarized below in Table 4.

Table 4: AERMOD Modeling Parameters for the Huntley Generating Station Area of Analysis

Huntley Generating Station Area of Analysis	
AERMOD Version	14134
Dispersion Characteristics	Rural

Modeled Sources	1
Modeled Stacks	1
Modeled Structures	6
Modeled Fencelines	1
Total receptors	1,369
Emissions Type	Actual
Emissions Years	2012-2014
Meteorology Years	2012-2014
Surface Meteorology Station	Buffalo Niagara International Airport
Upper Air Meteorology Station	Buffalo Niagara International Airport
Methodology for Calculating Background SO_2 Concentration	Temporal Varying
Calculated Background SO_2 Concentration	1.30ppb – 4.49ppb depending on WD and WS

The results presented below in Table 5 show the magnitude and geographic location of the highest predicted modeled concentration based on actual emissions.

Table 5: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentration in the Huntley Generating Station Area of Analysis Based on Actual Emissions

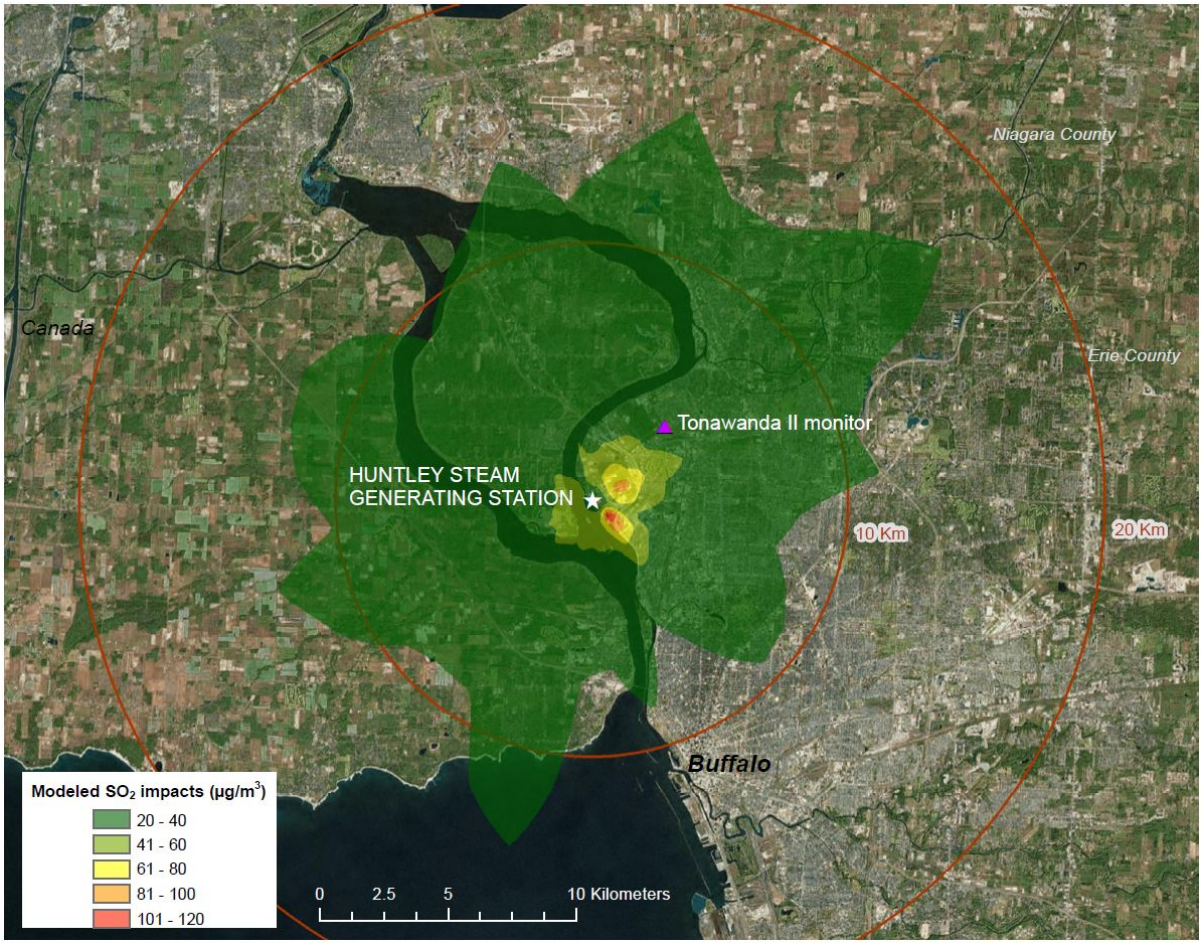
Averaging Period	Data Period	Receptor Location		SO_2 Concentration ($\mu g/m^3$)	
		UTM/Latitude	UTM/Longitude	Modeled (including background)	NAAQS
99th Percentile 1-Hour Average	2012-2014	668784.63E	4759614.9N	142.3	196.5*

*Equivalent to the 2010 SO_2 NAAQS set at 75 ppb

The State's modeling indicates that the predicted 99th percentile 1-hour average concentration within the chosen modeling domain is 142.3 $\mu g/m^3$, or 54.3 ppb. This modeled concentration included the background concentration of SO_2, and is based on actual emissions from the facilities.

Figure 6 below was included as part of the State's recommendation and shows the modeled impact of Huntley Generating Station on the 1-hr SO_2 design value in the area.

Figure 6: Modeled impact of Huntley Generating Station on 1-hour SO_2 Design Value



Detailed Assessment for Somerset Generating Station

Air Quality Data

This factor considers the SO_2 air quality monitoring data in the area surrounding Somerset Generating Station. The facility is located in Niagara County, and the State included monitoring data from the Air Quality Systems monitor (Niagara Falls) - monitor id -360632008) closest to the facility in its recommendation. This monitor shut down in 2013 and was located at Frontier Avenue and 55th Street, Niagara Falls, NY. New York used data from 2010 – 2012 in their modeling since that was the period with the most recent SO_2 background data for their modeling analysis. The more urban setting of the monitor as compared to the facility as well as the data being a year older when trends had been coming down for SO_2 made this a conservative choice of representative background data. This monitor was approximately 45 km away from Somerset Generating Station. Data collected at this monitor indicates that SO_2 concentrations are well below the SO_2 NAAQS and have been trending downward. In addition, this data has been quality assured and are valid for comparison to the NAAQS. The State intended all available data collected at this monitor to support and corroborate air dispersion modeling results; the discussion of these modeled results follows in Table 6 below.

Table 6: Available Air Quality Data for the Area Closest to Somerset Generating Station.

County	Air Quality Systems (AQS) Monitor ID	Monitor Location	Distance to Somerset Generating Station	'10 – '12 DV (ppb)	'11 – '13 DV (ppb)	'12 – '14 DV (ppb)
Niagara	36-063-2008	Frontier Ave at 55th Street, Niagara Falls, NY	45 km	14	*	*

* - Monitor shut down at end of 2012

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. In some instances the recommended model may be a model other than AERMOD, such as the BLP model for buoyant line sources. 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
- BPIPPRIME: 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 14134, and a discussion of the individual components will be referenced in the corresponding discussion that follows, as appropriate.

Modeling Parameter: Rural or Urban Dispersion

When performing the modeling for the area of analysis, the State determined that it was most appropriate to run the model in rural mode.

The State came to this conclusion by examining the land-use within 3 km of the facility. They analyzed the meteorological data using the AERSURFACE pre-processor. AERSURFACE uses land cover data from the National Land Cover Data (NCLD) 1992 database to determine the surface roughness, albedo, and Bowen ratio.

Modeling Parameter: Area of Analysis (Receptor Grid)

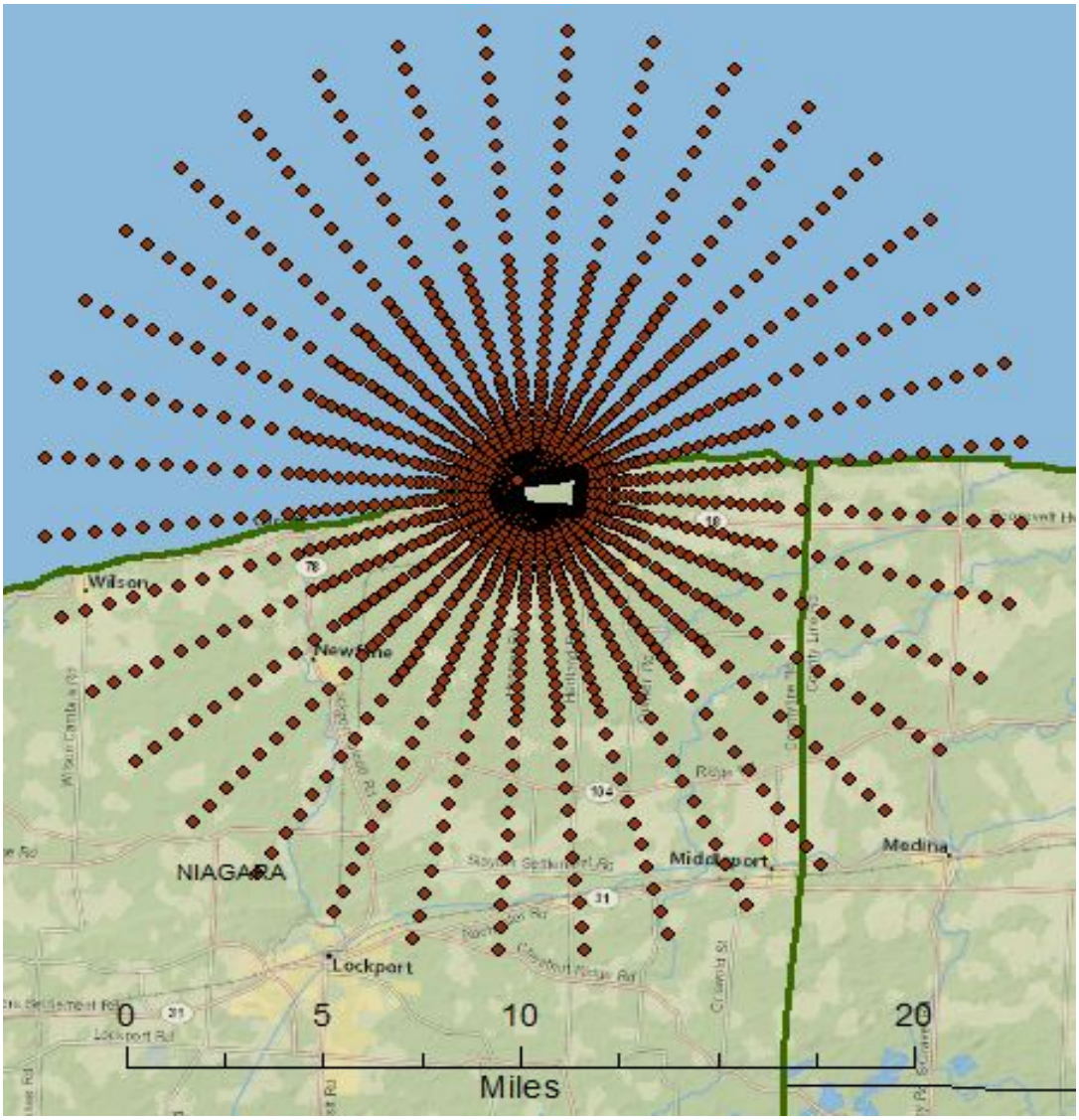
The EPA believes that a reasonable first step towards characterization of air quality in the area surrounding the Somerset Generating Station is to determine the extent of the area of analysis, i.e., receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations. For the area surrounding the Somerset Generating Station in the Erie - Niagara, NY area, the State used only ambient monitoring data along with the Somerset Generating Station modeling results since the ambient monitoring data, to a large degree, reflect the contributions from the other sources in the area.

- 100 m spacing from the source to 2km
- 250 m spacing from 2 km to 5 km
- 500 m spacing from 5 km to 10 km
- 1000 m spacing from 10 km to 20 km

Receptors were placed on 36 radials 10 degrees apart and the grid was centered on the emission source. Receptors within the Somerset fence line were eliminated as non-ambient and special receptors were placed along the fence line at every 50 m. The grid contained a total of 1723 receptors. While the EPA believes that with increasing distance, spatial resolution may diminish while using a polar grid (as opposed to Cartesian), since the maximum concentration from the facility was close in and was well below the NAAQS, we feel that this is acceptable.

Figure 7, included in the State's recommendation, shows the State's chosen area of analysis surrounding the Somerset Generating Station, as well as the receptor grid for the area of analysis.

Figure 7: Somerset Area of Analysis



Consistent with the Modeling TAD, receptors for the purposes of this designation effort were placed only in areas where it would also be feasible to place a monitor to record ambient impacts. The impacts of the area's geography and topography will be discussed later within this document.

Modeling Parameter: Source Characterization

The State characterized the source(s) 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. The AERMOD component BPIPPRIME was used to assist in addressing building downwash.

Modeling Parameter: Emissions

The EPA's Modeling TAD notes that for the purposes 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 does provide for the flexibility of using allowable emissions in the form of the most recently permitted (referred to as PTE or allowable) emissions rate.

The EPA believes that continuous emissions monitoring systems (CEMS) data provide acceptable historical emissions information, when it is available, and that 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 believes that detailed throughput, operating schedules, and emissions information from the impacted source(s) should be used.

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. Specifically, a facility may have recently adopted a new federally enforceable emissions limit, been subject to a federally enforceable consent decree, or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS. These new limits or conditions may be used in the application of AERMOD. In these cases, the Modeling TAD notes that the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations should contain the necessary emissions information for designations-related modeling. 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, the State only included ambient monitoring data along with the Somerset Generating Station for this analysis. New York said that since monitor data in the area already to a large degree reflect the contribution of Somerset and nearby sources to the SO_2 concentration, it was not necessary to include emissions from sources other than Somerset in the modeling. All of the available monitor data was used in calculating the seasonal/hourly background values, including the time periods when the nearby sources were impacting the monitor. As such, the modeled concentrations, which include seasonal/hourly 99^{th} percentile background, can be expected to be highly conservative. Actual emissions data obtained from temporally variable rates for Somerset Generating Station between 2012 and 2014 are summarized in Table 7 below.

Table 7: Actual SO_2 Emissions between 2012 and 2014 from Facilities in the Erie - Niagara, NY Area of Analysis

Facility Name	SO_2 Emissions (tons per year)		
	2012	2013	2014
Somerset Generating Station	5,653	5,723	4,817

Modeling Parameter: Meteorology and Surface Characteristics

The most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. However, as mentioned above, New York used 2010 – 2012 meteorological data since the nearest monitor had shut down in 2013 and this data set would be more conservative. As noted in the Modeling TAD, the selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of the data are 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 NWS stations, site-specific or onsite data, and other sources such as universities, FAA, and military stations.

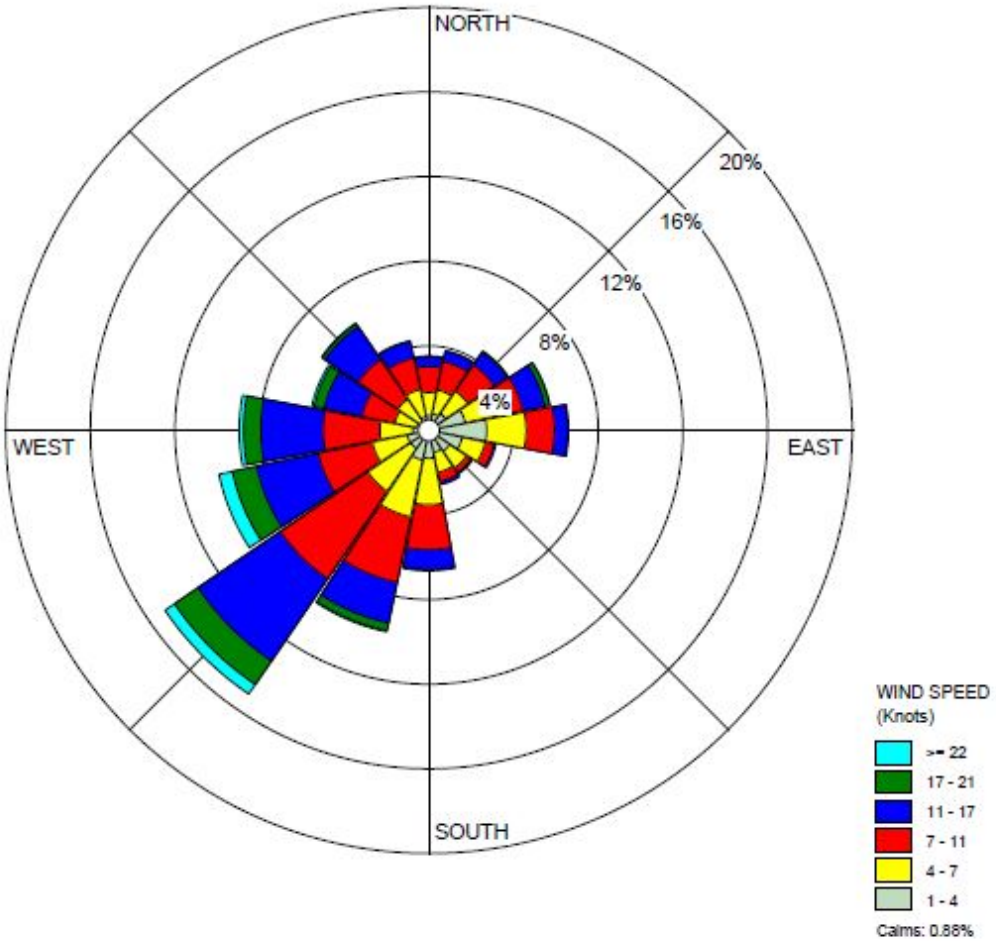
For the Erie - Niagara, NY area of analysis, surface and upper air data were obtained from the Buffalo Niagara International Airport, approximately 40 km to the southwest, and were selected as best representative of meteorological conditions within the area of analysis.

The State used AERSURFACE version 13016 using data from the Buffalo Niagara International Airport (located at 685258.87E, 4756637.93N) to estimate the surface characteristics of the area of analysis. The State estimated values for 360 degrees out to 1 km at a seasonal temporal resolution for average conditions. The State also estimated values for albedo (the fraction of solar energy reflected from the earth back into space), the Bowen ratio (the method generally used to calculate heat lost or heat gained in a substance), and the surface roughness (sometimes referred to as “Zo”). In Figure 8 below, included in the State’s recommendation, the location of the Buffalo Niagara International Airport station is shown relative to the Somerset Generating Station area of analysis.

Figure 8: Somerset Generating Station Area of Analysis and the Buffalo Niagara International Airport

As part of its recommendation, the State provided the 3-year surface wind rose for the Buffalo Niagara International Airport. In Figure 9, 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 southwest.

Figure 9: Buffalo Niagara International Airport Cumulative Annual Wind Rose (2011 – 2013)



Meteorological data from the above surface and upper air stations were used in generating AERMOD-ready files with the AERMET processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The State followed the methodology and settings presented EPA's Guideline on Air Quality Models (40 CFR Appendix W) and DEC's Air Modeling Procedures as outlined in DAR-10 / NYSDEC Guidelines on Dispersion Modeling Procedures for Air Quality Impact Analysis, modified by the SO2 NAAQS Designations 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 one minute duration was provided from the same instrument tower, but in a different formatted file to be processed by a separate preprocessor, AERMINUTE. 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 one minute wind data.

Modeling Parameter: Geography and Terrain

The terrain in the area of analysis is best described as gently rolling. To account for these terrain changes, the AERMAP 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.

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 "first tier" approach, based on monitored design values, or 2) a temporally varying approach, based on the 99^{th} percentile monitored concentrations by hour of day and season or month. For the Somerset Generating Station area of analysis, the State chose this second approach. The hourly SO_2 data from the Niagara Falls monitor for the period 2010 – 2012 were processed to obtain 3-year averages of the 99^{th} percentile concentrations by season and hour-of-day. The background concentrations for this area of analysis varied by wind direction and wind speed and were incorporated into the final AERMOD results. New York acknowledges that the modeled concentrations can be expected to be highly conservative but should not have a major impact on the final design value.

Summary of Modeling Results

The AERMOD modeling parameters for the Somerset Generating Station area of analysis are summarized below in Table 8.

Table 8: AERMOD Modeling Parameters for the Somerset Generating Station Area of Analysis

Somerset Generating Station Area of Analysis	
AERMOD Version	14134
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	1
Modeled Structures	18
Modeled Fencelines	1
Total receptors	1,723
Emissions Type	Actual
Emissions Years	2011-2013
Meteorology Years	2011-2013*
Surface Meteorology Station	Buffalo Niagara International Airport
Upper Air Meteorology Station	Buffalo Niagara International Airport
Methodology for Calculating Background SO_2 Concentration	Temporal Varying
Calculated Background SO_2 Concentration	4ppb – 10ppb depending on WD and WS

* NY processed 5 years of surface and upper air met data but were truncated to dates that fit the hourly emissions records (Jan. 1, 2011 to Dec. 31 2013).

The results presented below in Table 9 show the magnitude and geographic location of the highest predicted modeled concentration based on actual emissions.

Table 9: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentration in the Somerset Generating Station Area of Analysis Based on Actual Emissions

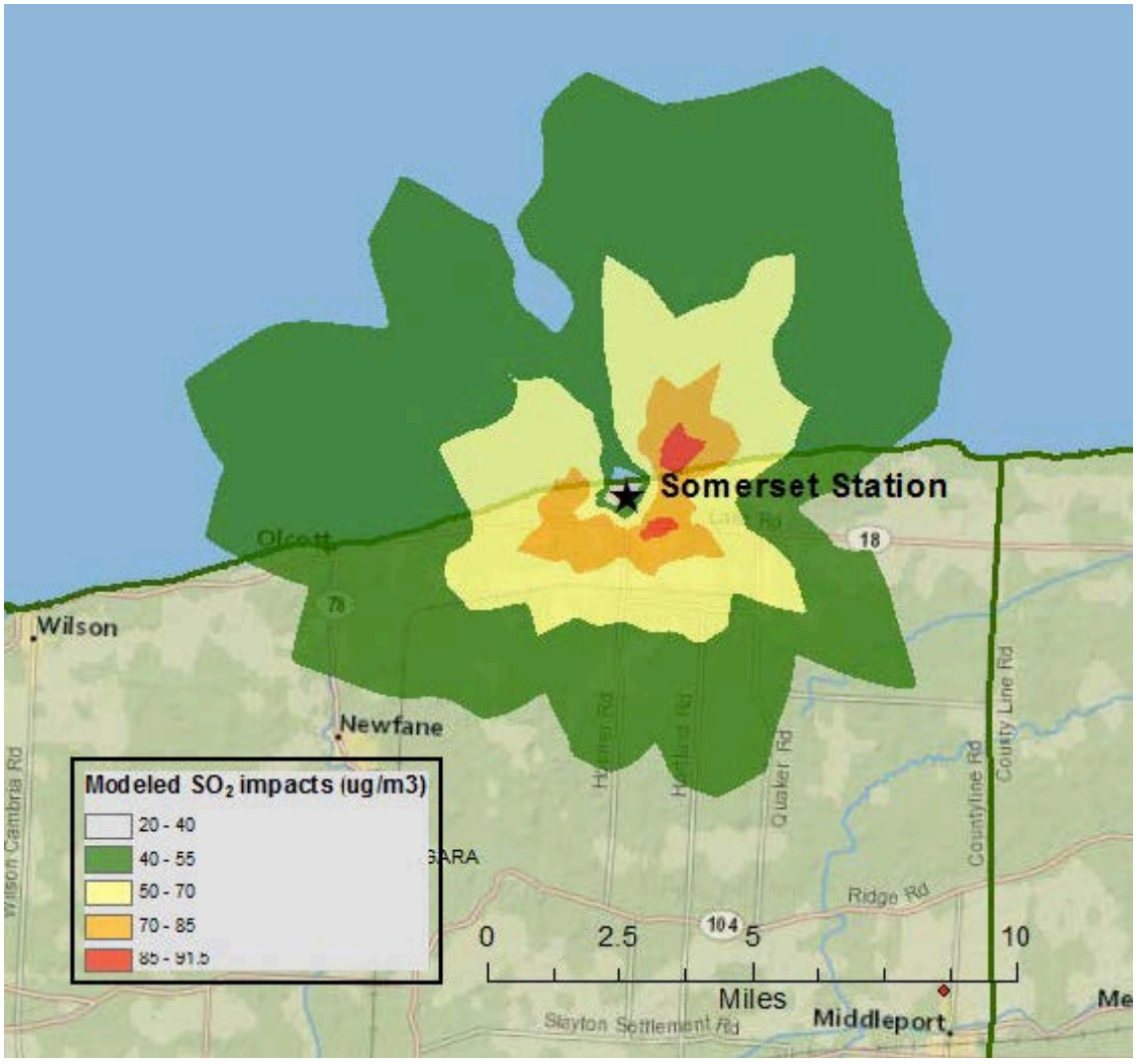
Averaging Period	Data Period	Receptor Location		SO_2 Concentration ($\mu g/m^3$)	
		UTM/Latitude	UTM/Longitude	Modeled (including background)	NAAQS
99th Percentile 1-Hour Average	2012-2014	694120.63E	4803304.06N	111.7	196.5*

*Equivalent to the 2010 SO_2 NAAQS set at 75 ppb

The State's modeling indicates that the predicted 99th percentile 1-hour average concentration within the chosen modeling domain is 111.7 μg/m^3, or 42.6 ppb. This modeled concentration included the background concentration of SO_2, and is based on actual emissions from the facilities.

Figure 10 below was included as part of the State's recommendation and shows the modeled impact of Somerset Generating Station on the 1-hr SO_2 design value in the area.

Figure 10: Modeled impact of Somerset Generating Station on 1-hour SO_2 Design Value



Jurisdictional Boundaries for Erie - Niagara, NY area:

Once the geographic area of analysis associated with the Huntley Generating Station and the Somerset Generating System are determined, existing jurisdictional boundaries are considered

for the purpose of informing our intended unclassifiable/attainment area, specifically with respect to clearly defined legal boundaries.

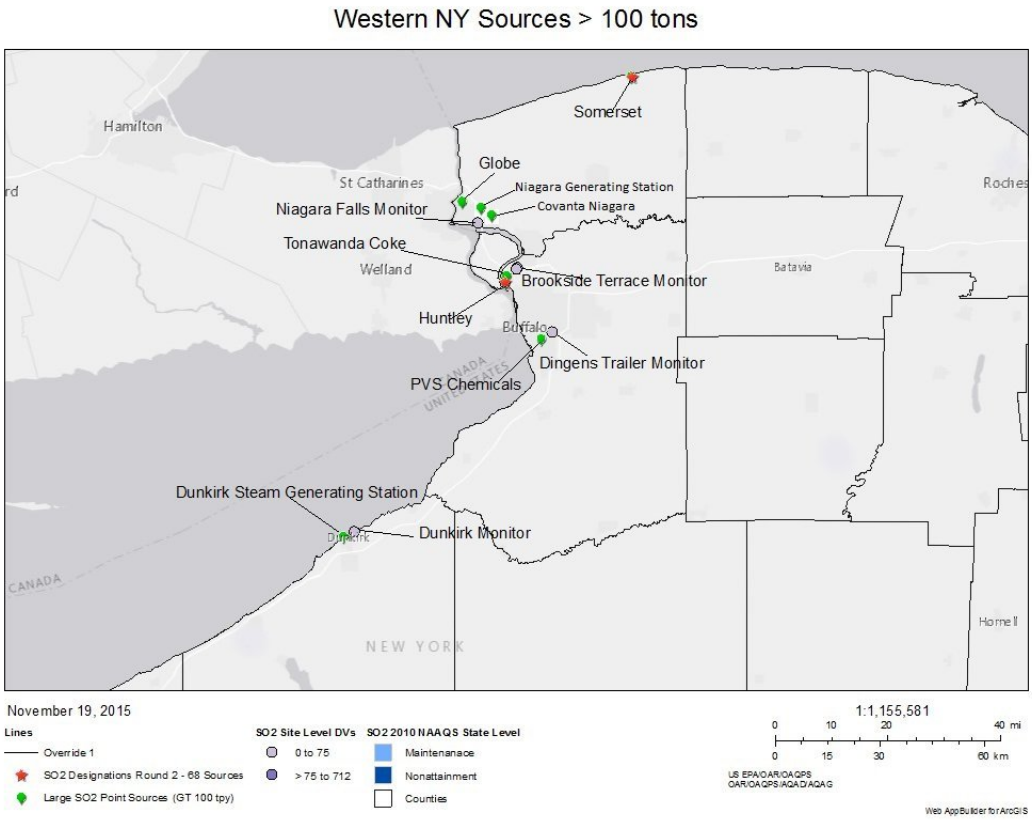
In its recommendation to EPA, New York used the boundaries of the Buffalo-Cheektowaga, NY Combined Statistical Area (CSA) as the starting point for their analysis. This was based on the high degree of economic and social integration between the core population nucleus, and the adjacent communities in the metropolitan statistical areas (MSA) that make up the CSA. New York also noted that EPA has historically used the CSA as a starting point for considering designation recommendations.

The Buffalo-Cheektowaga, NY CSA is comprised of the Buffalo-Cheektowaga-Niagara Falls, NY MSA (Erie and Niagara Counties), and the Olean, NY MSA (Cattaraugus County).

EPA believes that it is currently premature to include counties in the July 2016 designation that did not meet the established criteria in the court's order for being designated in the first round due July 2, 2016, especially if impacts to that county from neighboring sources have not been evaluated. New York did not evaluate the impact to Cattaraugus County from nearby areas in its updated recommendation.

For Niagara and Erie Counties, EPA believes that a full county designation (rather than a partial county designation) of unclassifiable/attainment is appropriate as explained below. Figure 11 below shows a map of the area showing stationary sources emitting 100 tpy of SO_2 or more, ambient air quality monitors, and county boundaries.

Figure 11: Area map of stationary sources, ambient air quality monitors, and county boundaries in western New York



Niagara County

As previously discussed, the air dispersion modeling results for Somerset performed by New York indicate that the entire area of analysis attains the 2010 SO_2 NAAQS; therefore, the EPA believes that it is unlikely for emissions from Somerset to cause or contribute to a violation of the NAAQS in Niagara County or any neighboring county. There are 3 other sources within Niagara County that emit 100 tpy or more of SO_2. These facilities are Globe Metallurgical, Niagara Generating Station, and Covanta Niagara. Their emissions are below the DRR threshold of 2,000 tpy when considered alone or when considered a single source, i.e., a cluster, and the EPA believes that our assessment of these sources and their emissions as described below support the notion that the entirety of Niagara County is attaining the NAAQS, and that no sources in Niagara County are causing or contributing to a violation of the NAAQS in a neighboring county.

According to 2014 data provided by the State, the largest of these sources, Globe Metallurgical emitted 573 tons of SO_2, while Niagara Generating Station's emissions were 244 tons of SO_2 and Covanta Niagara's emissions were 225 tons of SO_2. All of these sources are located in the Niagara Falls metropolitan area. The emissions from Globe Metallurgical have been decreasing since 2012 while the Niagara Generating Station and Covanta Niagara emissions have been increasing since 2012. However, the Niagara Generating Station and Covanta Niagara emissions are less than half of the Globe Metallurgical emissions.

The Niagara Falls air monitor (AQS Site ID 36-063-2008), which was used by New York in its modeling for Somerset to represent background data as discussed previously, and whose historical monitoring data is presented earlier in this document, is in close proximity (within 5 km) to these 3 facilities. Historical data collected at this monitor indicate that SO_2 concentrations were well below the SO_2 NAAQS and were trending downward. The most recent design value, based on data collected between 2010 and 2012 was 14 ppb (the monitor shut down at the end of 2012). Due to the location of the monitor in relation to the facilities and prevailing wind patterns, it is unknown whether this monitor was deployed in order to capture the maximum impacts from any of the 3 facilities. However, based on the decreasing emissions from the facilities over time, the available historical ambient air quality data, and the distance to the nearest New York county border of approximately 15 - 20 km, the EPA does not believe that the potential impacts from these facilities extend into any neighboring county in New York.

Other nearby sources that could potentially impact Niagara County are Huntley Generating Station, and Tonawanda Coke, which are in Erie County. As previously discussed, the modeled impact from Huntley Generating Station, which emitted over 3,000 tons of SO_2 in 2014 is well below the NAAQS, and is located on the southeastern border of the facility's property. Tonawanda Coke's emissions were 400 tpy in 2013, according to State emissions data, and are below the DRR threshold. The Brookside Terrace ambient air quality air monitor (AQS Site ID 36-029-1014), which is approximately 3.2 kilometers north of both facilities, and just south of the Niagara County/Erie County border, has monitored concentrations well below the NAAQS. As discussed previously in this document, the design values at this monitor have decreased over time, and the most recently available design value based on data collected between 2012 and 2014 was 22 ppb. Due to the prevailing wind patterns in the area, the EPA believes that this design value captures the maximum impacts from both Huntley Generating Station and Tonawanda Coke at the monitor location. Therefore, even in the absence of State modeling results which account for emissions from Towanada Coke, the EPA does not believe that the area encompassing the border between Niagara County and Erie County in the vicinity of the Brookside Terrace monitor are experiencing violations of the NAAQS due to the combined emissions from Huntley Generating Station and Towanada Coke.

Erie County

As previously discussed, the air dispersion modeling results for Huntley Generating Station performed by New York indicate that the entire area of analysis attains the 2010 SO_2 NAAQS; in conjunction with ambient air quality data collected at the Brookside Terrace monitor (AQS Site ID 36-029-1014) which account for emissions from both Huntley Generating Station and nearby Towanada Coke, the EPA believes that it is unlikely for emissions from either of these facilities to cause or contribute to a violation of the NAAQS in Erie County, or any neighboring county. There is one other source in Erie County emitting 100 tpy or greater of SO_2. PVS Chemical is located less than 20km from Huntley Generating Station and Towanada Coke, and the facility's 2013 SO_2 emissions were 139 tons according to State emissions data. The EPA believes that our

assessment of this source and its emissions as described below supports the notion that the entirety of Erie County is attaining the NAAQS, and that no sources in Erie County are causing or contributing to a violation of the NAAQS in a neighboring county.

The ambient air quality monitor at 185 Dingens Street in Buffalo (AQS Site ID 36-029-0005) is located in close proximity, i.e., approximately 2.5 km, to PVS Chemical. The design values have trended downwards in recent years, and the most recent design value based on data collected between 2012 and 2014 was 10 ppb. Because this monitor is located in an area that captures the general area where maximum SO_2 impacts from PVS Chemical are expected, the EPA believes that emissions from the facility are not expected to violate or contribute to a violation of the 2010 SO_2 NAAQS in any area of Erie County or a neighboring county.

The only other facility that might impact Erie County is the Dunkirk Steam Generating Station in neighboring Chautauqua County. Dunkirk Steam Generating Station is approximately 20 km southwest of the Erie County border. According to the EPA's 2014 Clean Air Markets database, the facility's SO_2 emissions were 951 tons. The New York State air monitor in the town of Dunkirk (AQS Site ID 36-013-0006, Wright Drive, Dunkirk, NY) is in close proximity, i.e., 2.5 km to the Dunkirk Generating Station, and has monitored concentrations well below the SO_2 NAAQS. Design values have trended downwards, and the most recent design value based on data collected between 2012 and 2014 was 18 ppb. Because this monitor is located in an area that captures the general area where maximum SO_2 impacts from Dunkirk Generating Station are expected, the EPA does not believe that emissions from Dunkirk Generating Station are causing or contributing to a violation of the 2010 SO_2 NAAQS in Erie County. The EPA would like to clarify that this assessment applies only to Dunkirk Steam Generating Station's potential impacts on Erie County, and is not intended to inform air quality characterization within Chautauqua County.

Evaluating all current information, the EPA does not believe that there are any stationary sources in any other neighboring county that cause or contribute to a violation of the 2010 SO_2 NAAQS in Erie County or Niagara County. As discussed above, the impacts from sources in Erie County and Niagara County are expected to attain the NAAQS with an adequate margin of safety, and furthermore, are not expected to cause or contribute to a violation of the NAAQS in any neighboring county in New York. As a result, the EPA believes that our intended unclassifiable/attainment area, consisting of Niagara County and Erie County in New York State, are comprised of clearly defined legal boundaries, and we find these boundaries to be a suitably clear basis for defining our intended unclassifiable/attainment area. As previously noted, New York has not evaluated the impact to Cattaraugus County from nearby areas in its recommendation, and in conjunction with the fact that Cattaraugus County does not contain any areas meeting the conditions requiring designation by July 2, 2016, the EPA is not proposing to designate any portion of Cattaraugus County at this time.

Other Relevant Information

The EPA did not receive any additional relevant information with respect to the two sources in New York State impacted by the July 2, 2016 court-ordered deadline.

Conclusion

After careful evaluation of the State's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the Erie - Niagara, NY area as unclassifiable/attainment for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of Niagara County and Erie County in New York State. This decision was made based on all available information, including historical ambient air quality monitoring, air dispersion modeling results performed by the State, and other supporting materials found in the State's updated recommendation.

At this time, our intended designations for the State only apply to the area presented in this technical support document. Consistent with the conditions in the March 2, 2015 court-ordered schedule, the EPA will evaluate and designate all remaining undesignated areas in New York by either December 31, 2017, or December 31, 2020.