Maryland
Department of the Environment

Larry Hogan
Governor

Boyd Rutherford
Lieutenant Governor

Ben Grumbles
Secretary

Mr. Shawn M. Garvin
Regional Administrator
U.S EPA Region 3
1650 Arch Street, 16th Floor, 3RA00
Philadelphia, PA 19103-2029

Dear Mr. Shawn Garvin:

Thank you for the opportunity to provide the Environmental Protection Agency (EPA) with updated recommendations for the 2010, 1-hour sulfur dioxide (SO_2) designation of Maryland's counties. In accordance with EPA's 2017, "round 3" of the designation process for the SO_2 standard, Maryland would like to update the recommendation for two areas. In 2011, Maryland recommended to EPA an "unclassifiable" designation; the State would like to update that as follows:

Area	Updated Recommended Designation
Charles County	Attainment
Prince George's County	Attainment

Attached for your review are the dispersion modeling reports and modeling files that AECOM prepared for the following:

- 1-hour SO_2 area including the NRG Morgantown Generating Station ("Morgantown"), in Newburg, Maryland in Charles County
- 1-hour SO_2 area including the NRG Chalk Point Generating Station ("Chalk Point"), in Aquasco, Maryland in Prince George's County

Note that MDE is submitting these modeling analyses both to substantiate the state's updated designation recommendations, above, and to meet the modeling requirements of the Data Requirements Rule (DRR) found at 40 CFR Part 51.1203 and 80 FR 51088, August 21, 2015. The DRR states this:

> (3) Except as provided by § 51.1204, the air agency shall conduct the modeling analysis for any applicable source identified by the air agency pursuant to paragraph (a) of this section, and for its associated area and any nearby area, as applicable, and submit the modeling analysis to the EPA Regional Office by January 13, 2017.

The attached analyses use actual hourly emissions data for three recent years of data, 2012-2014, consistent with EPA's "Data Requirements Rule for the 2010 1-Hour Sulfur Dioxide (SO_2) Primary National Ambient Air Quality Standard (NAAQS)," found at 40 CFR Part 51.1203 and 80 FR 51088, August 21, 2015. The attached analyses also address EPA's five-factor analysis as it is

delineated in EPA's March 20, 2015, memo, "Updated Guidance for Area Designations for the 2010 Primary Sulfur Dioxide National Ambient Air Quality Standard."

The attached analyses and additional information from MDE address the five-factor analysis as follows:

Chalk Point Generating Station

1. Ambient air quality data or dispersion modeling results:

AERMOD was used for the dispersion modeling. The modeled maximum total 1-hour SO_2 concentration is 106.79 $\mu g/m^3$, which is a sum of the modeled concentration, 77.97 $\mu g/m^3$, and the monitored background concentration of 28.82 $\mu g/m^3$. The 106.79 $\mu g/m^3$ 1-hour SO_2 concentration is well below the 2010, 1-hour SO_2 NAAQS of 196 $\mu g/m^3$. Based on the modeling analyses, the area demonstrates attainment of the standard.

2. Emissions-related data:

Chalk Point's emissions have decreased substantially since the implementation of SO_2 controls under the Maryland Healthy Air Act. The average annual SO_2 emission rate has decreased by over 85%, as shown in the table below (data from EPA's Clean Air Markets Division):

Facility Name	Facility ID (ORISPL)	Unit ID	2002 SO_2 (tons)	Average Annual SO_2 Rate Pre-HAA, 2002-09 (lbs/mmBtu)	Average Annual SO_2 Rate Post-HAA 2010-15 (lbs/mmBtu)	Average SO_2 % Reduction by Rate	SO_2 Controls
Chalk Point	1571	1	23,528.4	2.1895	0.2717	87.59%	Wet Limestone (Began Dec 21, 2009)
Chalk Point	1571	2	25,202.6	2.2100	0.2788	87.38%	Wet Limestone (Began Dec 21, 2009)

As noted above, the modeling used actual hourly emissions data for 2012-2014. Chalk Point's average annual SO_2 emissions rate for the years 2013-2015 has decreased another 25% from the 2012-2014 timeframe.

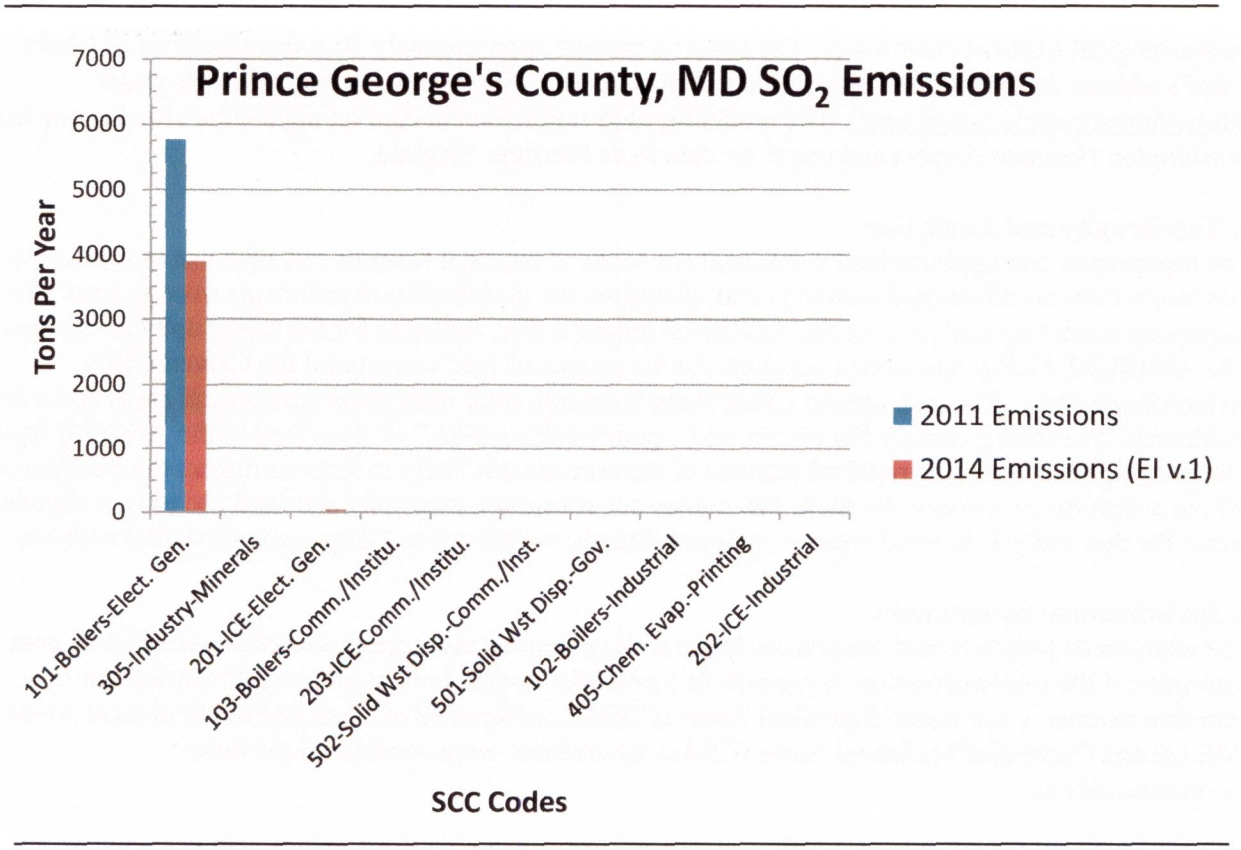
SO_2 rates (lbs/mmBtu)	**2012-2014 Average SO_2 Rate**	**2013-2015 Average SO_2 Rate**
Unit 1	0.3742	0.2809
Unit 2	0.3239	0.2419

All permitted SO_2 sources, located within 20 km of the affected source, were evaluated for a potential impact on the area being modeled based on the level of their actual emissions and proximity to the primary source. According to the AECOM analyses, the nearest large SO_2 emissions source to Chalk Point is the Morgantown Generating Station, approximately 48 km (30 miles) southwest. MDE analyzed the location of additional SO_2 emissions sources of 20 tpy or more throughout the area and found only one other, small SO_2 emissions source in the area of Chalk Point: the Naval Support Facility at Indian Head. This facility is also located approximately 48 km west from Chalk Point. Given the distance that these two facilities are from Chalk Point, they are not expected to have an impact on 1-hour SO_2

concentrations in the Chalk Point area. Please see Figure 2 on page 5.

Likewise, the Emissions Inventory for SO_2 emissions in Prince George's County, Maryland, shows that, other than SCC code 101, "External Combustion Boilers – Electric Generation" (shown as "101-Boiler-Electric Gen." in the figure below), other SCC codes of sources are mainly very small. These other SCC codes of sources emitted 45 tpy, 8 tpy, 4 tpy, 3 tpy, 2 tpy, and less than 1 tpy in 2014, according to version 1 of the 2014 Emissions Inventory (EI). They were also low in 2011. Please see Figure 1 below.

Figure 1



3. Meteorology:
The meteorology review looks at wind data gathered at stations in and near Maryland by the National Weather Service (NWS) and other sources from 2012-2014. Information presented under this factor is indicative of annual average winds. These data may also suggest that emissions originating from some directions may be more prone to contribute than emissions in other directions.

For pollutant dispersion, the most important meteorological parameter is wind speed and wind direction. In this region, surface weather systems predominantly travel from west to east, guided by either the sub-tropical or polar jet streams. The resulting surface transport winds associated with these systems will generally have a western component with additional southern components in the summer and northern

components in the winter, although, on any given day, winds can blow from any direction. Discussions regarding this factor will show representative wind roses for the source area and SO_2 sources surrounding Chalk Point.

The major geographic feature affecting winds in the area surrounding Chalk Point is the Patuxent River. The area is rural with some agricultural and forested areas which modify the surface roughness lengths and can impact wind speed and wind direction.

The dispersion modeling analyses conducted for this area accounts for a significant portion of this factor. The AERSURFACE preprocessor component of the AERMOD model accounts for land use and its impact on surface roughness lengths, albedo, and Bowen ratio for the meteorological site. The meteorological inputs to AERMOD itself are taken from measurements at the Calvert Cliffs meteorological measurement tower. The tower is located approximately 20 miles southeast of Chalk Point's address at 25100 Chalk Point Road, Aquasco, MD 20608, verified using Google maps (https://www.google.com/maps/). The modeling used supplemental data on night-time cloud cover from Washington National Airport and upper air data from Sterling, Virginia.

4. Topography and Land Use:
The topography and land use/land cover analysis looks at physical features and land use or land cover that might have an effect on the airshed and, therefore, the distribution of pollutants over an area. The dispersion modeling analysis, via the AERMAP preprocessor, accounts for the topography of the area. The AERSURFACE preprocessor accounts for the impact of land use around the Calvert Cliffs meteorological site. The area around Chalk Point is mainly rural with some agricultural areas and a few residences. The land is mainly flat terrain with "gently rolling hills," as described in the AECOM report. The geographical and topographical features of the area are not likely to limit or impact the transport of SO_2 in a significant manner. As such, MDE does not consider topography and land use to be a significant factor for this analysis beyond what is analyzed directly via the refined dispersion modeling analysis.

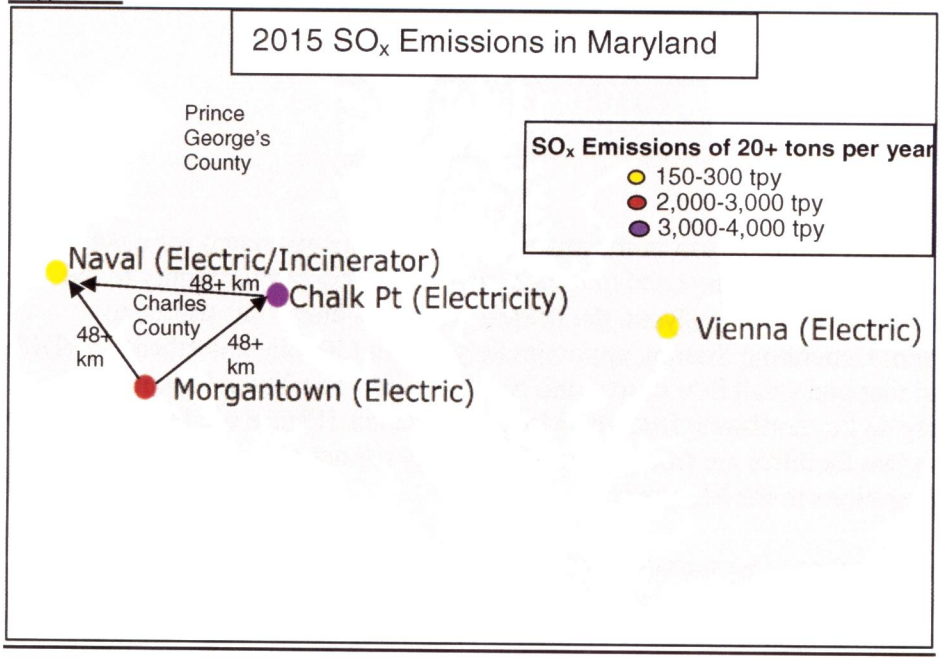
5. Jurisdictional boundaries:
The analysis of jurisdictional boundaries looks at the planning and organizational structure of an area to determine if the implementation of controls in a potential nonattainment area can be carried out in a cohesive manner. Core Based Statistical Areas (CBSAs), comprised of Metropolitan Statistical Areas (MSAs) and Combined Statistical Areas (CSAs), boundaries were considered for these recommendations.

The Washington-Arlington-Alexandria, DC-VA-MD-WV MSA includes Charles, Calvert, Frederick, Montgomery, and Prince George's Counties in Maryland. In Virginia, it includes Alexandria, Arlington County, Clarke County, Culpeper County, Fairfax County, Fairfax, Falls Church, Fauquier County, Loudoun County, Manassas, Manassas Park, Prince William County, Rappahannock County, Spotsylvania County, Stafford County, Fredericksburg, and Warren County. In addition, it includes the District of Columbia.

MDE is responsible for air quality planning within all areas of Maryland. The AECOM dispersion modeling analysis was inclusive of a 20 km radius around Chalk Point in Prince George's County. The AERMOD dispersion modeling demonstrated attainment of the 1-hour SO_2 standard for the area around Chalk Point. Also, MDE's analysis, reflected in the map below, found that no other major SO_2 sources exist in Prince George's County. Accordingly, MDE recommends that the entire county be designated

"attainment" for the 1-hour SO_2 standard.

Figure 2



Morgantown Generating Station

1. Ambient air quality data or dispersion modeling results:

AERMOD was used for the dispersion modeling. The modeled maximum total 1-hour SO_2 concentration is 82.11 $\mu g/m^3$, which is a sum of the modeled concentration, 53.29 $\mu g/m^3$, and the monitored background concentration of 28.82 $\mu g/m^3$. The 82.11 $\mu g/m^3$ 1-hour SO_2 concentration is well below the 2010, 1-hour SO_2 NAAQS of 196 $\mu g/m^3$. Based on the modeling analyses the area demonstrates attainment of the standard.

2. Emissions-related data:

Morgantown emissions have decreased substantially since the implementation of SO_2 controls under the Maryland Healthy Air Act. The average annual SO_2 emission rate has decreased by more than 94%, as shown in the table below (data from EPA's Clean Air Markets Division):

Facility Name	Facility ID (ORISPL)	Unit ID	2002 SO_2 (tons)	Average Annual SO_2 Rate Pre-HAA, 2002-09 (lbs/mmBtu)	Average Annual SO_2 Rate Post-HAA 2010-15 (lbs/mmBtu)	Average SO_2 % Reduction by Rate	SO_2 Controls
Morgantown	1573	1	37,756.6	2.4585	0.1343	94.54%	Wet Limestone (Began 12/21/2009)
Morgantown	1573	2	32,586.8	2.4258	0.1189	95.10%	Wet Limestone (Began 12/21/2009)

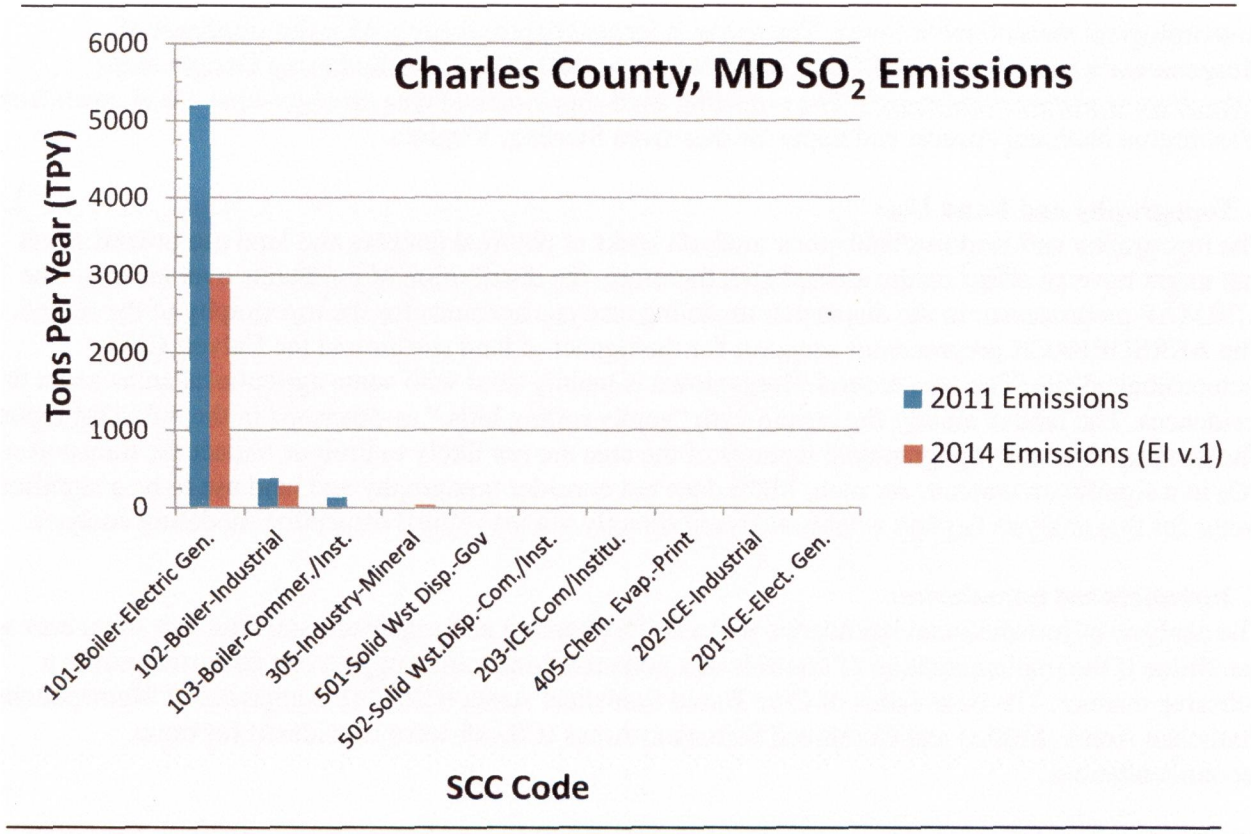
As noted above, the modeling used actual hourly emissions data for 2012-2014. The Morgantown station's 2013-2015 emissions rates are similar to their 2012-2014 emissions rates.

SO_2 rates (lbs/mmBtu)	2012-2014 Average Rate	2013-2015 Average Rate
Unit 1	0.1112	0.1171
Unit 2	0.1130	0.1187

All permitted SO_2 sources, located within 20 km of the affected source, were evaluated for a potential impact on the area being modeled based on the level of their actual emissions and proximity to the primary source. According to the AECOM analyses, the nearest large SO_2 emissions source to Morgantown is the Chalk Point Generating Station, approximately 48 km (30 miles) northeast. MDE's supplemental analyses found that one small SO_2 source, the Naval Support Facility at Indian Head located, is also approximately 48 km northwest from the Morgantown area. (Please see Figure 1, above.) Given the distance that these two facilities are from Morgantown, they are not expected to have an impact on 1-hour SO_2 concentrations in the Morgantown area.

Likewise, the Emissions Inventory for SO_2 emissions in Charles County, Maryland, shows that, other than SCC code 101, "External Combustion Boilers – Electric Generation" (shown as "101-Boiler-Electric Gen." in the figure below), other SCC codes of sources are mainly very small. These other SCC codes of sources emitted 283 tpy, 36 tpy, 2 tpy, 1 tpy, and less than 1 tpy in 2014, according to version 1 of the 2014 Emissions Inventory (EI). They were also low in 2011, with some SCC categories showing further decreases from 2011 to 2014. Please see Figure 3 below.

Figure 3



3. Meteorology:
The meteorology review looks at wind data gathered at stations in and near Maryland by the National Weather Service (NWS) and other sources from 2012-2014. Information presented under this factor is indicative of annual average winds. These data may also suggest that emissions originating from some directions may be more prone to contribute than emissions in other directions.

For pollutant dispersion, the most important meteorological parameter is wind speed and wind direction. In this region, surface weather systems predominantly travel from west to east, guided by either the sub-tropical or polar jet streams. The resulting surface transport winds associated with these systems will generally have a western component with additional southern components in the summer and northern components in the winter, although, on any given day, winds can blow from any direction. Discussions regarding this factor will show representative wind roses for the source area and SO_2 sources surrounding Morgantown.

The major geographic feature affecting winds in the area surrounding Morgantown is the Potomac River. The area is rural with some agricultural and forested areas which modify the surface roughness lengths and can impact wind speed and wind direction.

The dispersion modeling analysis conducted for this area takes into account a significant portion of this factor. The AERSURFACE preprocessor component of the AERMOD model accounts for land use and

its impact on surface roughness lengths, albedo, and Bowen ratio for the meteorological site. The meteorological inputs to AERMOD itself are taken from measurements at the Calvert Cliffs meteorological measurement tower. The tower is located approximately 45 miles northeast of Morgantown's address at 12620 Crain Hwy, Newburg, MD 20664, verified using Google maps (https://www.google.com/maps/). The modeling used supplemental data on night-time cloud cover from Washington National Airport and upper air data from Sterling, Virginia.

4. Topography and Land Use:
The topography and land use/land cover analysis looks at physical features and land use or land cover that might have an effect on the airshed and, therefore, the distribution of pollutants over an area. The AERMAP preprocessor in the dispersion modeling analysis accounts for the topography of the region. The AERSURFACE preprocessor accounts for the impact of land use around the Calvert Cliffs meteorological site. The area around Morgantown is mainly rural with some agricultural areas and a few residences. The land is mainly flat terrain with "gently rolling hills," as described in the AECOM report. The geographical and topographical features of the area are not likely to limit or impact the transport of SO_2 in a significant manner. As such, MDE does not consider topography and land use to be a significant factor for this analysis beyond what is analyzed directly via the refined dispersion modeling analysis.

5. Jurisdictional boundaries:
The analysis of jurisdictional boundaries looks at the planning and organizational structure of an area to determine if the implementation of controls in a potential nonattainment area can be carried out in a cohesive manner. The boundaries of Core Based Statistical Areas (CBSAs), comprised of Metropolitan Statistical Areas (MSAs) and Combined Statistical Areas (CSAs), were considered for these recommendations.

The Washington-Arlington-Alexandria, DC-VA-MD-WV MSA includes Charles, Calvert, Frederick, Montgomery, and Prince George's Counties in Maryland; Alexandria, Arlington County, Clarke County, Culpeper County, Fairfax County, Fairfax, Falls Church, Fauquier County, Loudoun County, Manassas, Manassas Park, Prince William County, Rappahannock County, Spotsylvania County, Stafford County, Fredericksburg, and Warren County in Virginia; and the District of Columbia.

MDE is responsible for air quality planning within all areas of Maryland. The AECOM dispersion modeling analysis was inclusive of a 20 km radius around Morgantown in Charles County. The AERMOD dispersion modeling demonstrated attainment of the 1-hour SO_2 standard for the area around Morgantown. Also, MDE's analysis found that no other major SO_2 sources exist in Charles County. Please see Figure 1 under the **Chalk Point Generating Station** section, above. Accordingly, MDE recommends that the entire county be designated "attainment" for the 1-hour SO_2 standard.

If I can provide any further information, please contact me at (410) 537-3084, or please contact George (Tad) S. Aburn, Jr., Director, Air and Radiation Management Administration, at telephone (410) 537-3255, or email george.aburn@maryland.gov.

Sincerely,

Ben Grumbles
Secretary

cc: Cristina Fernandez, Director, Air Protection Division, EPA Region III
George S. (Tad) Aburn

Attachments