Appendix H
Painesville Municipal Electric Plant, Lake County, OH
SO2 Averaging

Background:

The following emissions units are the major sources of SO2 emissions at the facility:

- B001 (Pulverized coal Fired boiler #5 with a de-rated heat input capacity of 249 MMBtu/hr)
- B003 (Stoker type, coal fired boiler #3 with a maximum heat input capacity of 218.5 MMBtu/hr)
- B004 (Stoker type, coal fired boiler #4 with a maximum heat input capacity of 379.3 MMBtu/hr)

Title V permit was issued on February 16, 2007 and it has the following limitations for SO2:

- B001: 5.7 lbs/MMBtu
- B003: 5.7 lbs/MMBtu
- B004: 5.7 lbs/MMBtu
- Combined average operating rate of B001, B003, and B004: 593 MMBtu/hr for any calendar day

Painesville Municipal Power's Title V permit requires maintaining monthly records of the total quantity of coal received and the result of analysis of its heat content, sulfur content, and ash content via analysis of a monthly composite of all coal shipments. It also requires hourly monitoring of heat input, in MMBtu/hr, via a computerized system and computing a daily operating hour average operating MMBut/hr rate. A copy of the currently issued Title V permit is included in Appendix A of this document for informational purposes. Ohio EPA will use the same methods for determining compliance with the following proposed limitations. A discussion of how the proposed limitations were derived follows.

- B001, B003 and B004 will be restricted to allow operation of only one unit at any time, except for coinciding periods of start-up and shutdown.
- SO2 emission rate of 4.0 lb/MMBtu for emissions units B001, B003, and B004.
- 30-day average limit for B001 of 71.692 MMBtu/hr.
- 30-day average limit for B003 or B004 of 85.024 MMBtu/hr.
- Combined 24-operating hour average limit of 249 MMBtu/hr for any calendar day for units B001, B003 and B004.
- 10% "Limited Use" capacity restriction with compliance determined for each boiler in accordance with U.S. EPA's Boiler MACT.

The 30-day average limit will be computed from the same hourly monitoring of heat input on a 30-day rolling average basis.

SO2 Averaging Approach:

The Guidance for 1-hour SO2 Nonattainment Area SIP Submissions dated April 23, 2014 was used to develop a long term limit for the three emissions units (B001, B003, and B004) at the facility. Details about the averaging method are provided in section D.2, Appendix B, Appendix C, and Appendix D of the guidance.

Based on the guidance, averaging periods longer than 1 hour are allowed to account for variability of SO2 1-hour emissions rate. However, any emissions limits based on averaging periods longer than 1 hour should have comparable stringency to the critical emission value. The guidance uses the term "critical emission value" to refer to the hourly emission rate that the model predicts would result in the 5-year average of the annual 99th percentile of daily maximum hourly SO2 concentrations at the level of the 1-hour National Ambient Air Quality Standard (NAAQS). The guidance acknowledges that short term periods of emissions above the critical emission value occur at sources with highly variable hourly SO2 emissions. These kind of sources are allowed to develop a longer-term average emission limits using averaging times up to 30-days. These sources should consider a lower long term limit to ensure comparable stringency to the 1-hour average limit at the critical emission value. The adjusted longer term limit would allow occasional spikes above the critical emission value. However, the guidance recommends establishing a supplemental shorter averaging time, such as 24 hours, emissions limit in conjunction with the longer term average limit to avoid spikes at the source that may cause NAAQS violations. This supplementary short term averaging limit could be higher than the critical emission value. The averaging approach should result in a comparable control strategy to operating the source at the critical emission value to be considered comparably stringent and to insure that NAAQS violations do not occur.

Establishing the Long Term Averaging Limit:

Establishing the long term average involves the following steps:

Step 1: Conducting dispersion modeling to determine the critical emission values

Multi-source allowable dispersion modeling was completed and the following critical emission values and restrictions were established:

- B001: 362.997 lbs/hr
- B003 or B004: 430.499 lbs/hr
- No more than one unit will be operated at any one time

Step 2: Compile emissions data reflecting the distribution of emission that is expected once the attainment plan is implemented

Since expected hourly emissions of SO2 not available at the source, the generic ratio of 0.79 was used.

Step 3: Compute a distribution of longer term emission averages

Since expected hourly emissions of SO2 not available at the source, the generic ratio of 0.79 was used.

Step 4: Determine the 99th percentile of the 1-hour average emission values compiled in step 2 and the 99th percentile of the 30-day average emission values computed in step 3

Since expected hourly emissions of SO2 not available at the source, the generic ratio of 0.79 was used.

Step 5: compute the ratio of *the 99th percentile of the 1-hour average emission values and the 99th percentile of the 30-day average emission values*

Since expected hourly emissions of SO2 not available at the source, the generic ratio of 0.79 was used.

Step 6: Multiply the ratio by the critical emission value

- 30-day average limit for B001: 362.997 lbs/hr x 0.79 = 286.768 lbs/hr
  Using the RACM SO2 emission rate of 4.0 lbs SO2/MMBtu, the 30-day average limit is 71.692 MMBtu/hr *[calculations: 286.6768 lbs/hr divide by 4.0 lbs/MMBtu]*
- 30-day average limit for B003 or B004 : 430.499 x 0.79 = 340.094 lbs/hr
  Using the RACM SO2 emission rate of 4.0 lbs SO2/MMBtu, the 30-day average limit is 85.024 MMBtu/hr *[calculations: 340.094 lbs/hr divide by 4.0 lbs/MMBtu]*

*Note: Reasonably Available Control Measures (RACM) was determined to be use of a lower sulfur coal than currently permitted that affords a reduction in the current permitted average SO2 emission rate of 5.7 lb/MMBtu to a rate of 4.0 lb/MMBtu for emissions units B001, B003, and B004.

Establishing a Supplemental Short Term Averaging Limit or Other Strategy to Reduce Probability of Emission Spikes

It is recommended to establish a daily or weekly limit in conjunction with the 30-day average limit to avoid spike SO2 emissions from the source that potentially result in NAAQS violations. The supplemental short limit for each emissions unit is higher than the critical emission value but low enough to reduce the probability of causing NAAQS violations.

Painesville Municipal Electric Plant has proposed a 24-operating hour average limit of 249 MMBtu/hr for any calendar day. Using these restrictions the supplemental short term limits are:

- 24-hour average limit for B001, B003 or B004: 996 lbs/hr *[calculations: 4.0 lb/MMBtu x 249 MMBtu/hr]*

In addition, Emissions units B001, B003, and B004 will be used in the future only as needed, for example, for high demand or interrupted supply periods. For high demand

periods, the spikes may occur for a few hours in a 24-hour period. For interrupted supply of electricity coming to the City of Painesville, the need could be a few hours or a few days depending upon the severity of the interruption. However, these types of circumstances are not conducive to setting firm limitations. Regardless, this facility is subject to U.S. EPA's Boiler MACT and as a compliance options will be accepting a federally enforceable operating limit that reduces each unit's annual het input capacity by 90% to meet the "Limited Use" definition under the Boiler MACT (40 CFR Section 63.7575).

The combination the limited use restriction, the 24-hour average limitation and the 30-day average limitation is sufficient to conservatively provide assurance that the 1-hour SO2 standard will be maintained in this area.