January 22, 2019

Clerk of the Board
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Comments on the 2018 Plan for the 1997, 2006, and 2012 PM2.5 Standards

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As the Air Resources Board prepares to vote on whether to adopt San Joaquin Valley's 2018 Plan for the 1997, 2006, and 2012 PM2.5 Standards, the Glass Packaging Institute (GPI) would like to reiterate our earlier communications and testimony (May 2018 and September 2018) to the San Joaquin Valley Air Pollution Control District, on this significant plan.

The glass container manufacturing industry operates three glass container plants in the San Joaquin Valley: Gallo Glass in Modesto, Owens-Illinois (O-I) in Tracy and Ardagh Glass in Madera, all of which would be impacted by changes in reduced NOx emissions. Collectively, these plants employ 2,000 Californians in high-paying, benefits-provided careers.

Glass container manufacturing companies with plant operations in the San Joaquin Valley have made continual and considerable investments in their glass container manufacturing plants to improve both efficiencies and air quality for the valley. Over the past 20 years, these improvements have resulted in an 85% reduction of NOx emissions. There is no known or demonstrated technology that will remove 100% of NOx from glass furnace emissions.

Our comments focus on planned reductions of NOx limits for natural gas-fired container glass melting furnaces, which are regulated under District Rule 4354.

GPI Recommendations

Future NOx Emissions Levels

The Plan includes future NOx emission levels for San Joaquin Valley glass melting furnaces. GPI asks the Air Resources Board to consider recent "consent decrees", which the US EPA has entered with glass container manufacturers around the country when reviewing the Plan.

A 2010 consent decree with Saint Gobain had NOx limits set at 1.3 lb./ton, and a 2017 consent decree with Owens-Illinois (O-I) placed the NOx limits at 1.1 lb./ton.

The average of the two decrees is 1.2 lbs./ton for NOx. **As such we believe, 1.2 lbs./ton, measured on a monthly rolling average, is an appropriate future NOx emissions limit, and is within scope of the Plan.**

The proposed NOx limit proposal is a significant reduction from the current NOx limit for San Joaquin Valley-based glass container furnaces (1.5 lb./ton), which became effective in 2014. A finalized limit of 1.2 would result in a NOx limit lower by 20 percent.

Implementation Date

An action date of 2021 for adoption of revisions to Rule 4354 has also been placed into the Plan, with an implementation date of 2023.

Prior to installation of any new equipment or technology, glass container manufacturing companies require sufficient time for planning, equipment specifications, equipment delivery, construction, etc. These improvements are placed into operational budgets several years in advance. Given these required adjustments, **GPI asks that an implementation date of 2024 be adopted for Rule 4354 prior to the lower NOx limits taking effect.**

Furnace Types and Utilization

The two widely-used types of natural–gas-fired glass container furnaces are oxyfuel firing and regenerative (non-oxyfuel firing) furnaces. In oxyfuel firing furnace technology, oxygen substitutes for much of the combustion air, reducing the amount of nitrogen in the furnace atmosphere and surrounding the burners, resulting in lower NOx emissions. In an oxyfuel furnace, oxygen at a concentration of over 90% is typically used for combustion.

It is important to note that oxyfuel furnace technology is not an "add-on technology" to a regenerative glass melting furnace; a regenerative furnace can only be converted to an oxyfuel furnace design during a major furnace re-bricking and rebuild project, **which typically occurs after twelve to fifteen years of continuous operation.**

Glass container plants with regenerative furnaces that use ambient air for combustion may utilize add-on NOx reduction technology including selective catalytic reduction (SCR) systems, or similar catalyst-embedded ceramic filters to meet the current limit of 1.5 lb. NOx / ton of glass.

The regenerative furnace design captures waste heat in a refractory regenerator and preheats combustion air by reversing air flow through the regenerator

roughly every 20 minutes. During the reversal, NOx levels in the exhaust gases make it difficult to inject the precise amount of ammonia needed in to react with the NOx in the SCR, thus potentially causing direct emissions of unreacted ammonia (aka, “ammonia slip”).

NOx reduction in these systems is proportional to the amount of ammonia (NH_3) injected and in contact with the NOx and catalyst, up to the limits of the system’s removal efficiency. After this timeframe, adding additional ammonia will not further reduce NOx.

The removal efficiency of both traditional SCR systems and catalyst embedded ceramic filters is approximately 70%. Attempting to drive NOx removal efficiency higher than 70% also increases the amount of ammonia slip. Ammonia emissions are a major source of atmospheric NOx, highlighting the irony of SCR, which runs the risk of controlling NOx emissions only by creating additional atmospheric NOx.

Thank you for your consideration of our comments.

Regards,

Joe

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