Together, We See Further

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Environmental Quality Board
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Re: Additional RACT Requirements for Major Sources of NOx and VOCs for the 2015 Ozone NAAQS

Dear Sir or Madam:

I am writing on behalf of Vitro Flat Glass, LLC ("Vitro") to submit comments on the proposed *Additional RACT Requirements for Major Sources of NOx and VOCs for the 2015 Ozone NAAQS* ("RACT III") issued for public notice and comment at 51 PA Bulletin 4333 (August 7, 2021).

By way of background, Vitro operates a flat glass plant in Carlisle, Pennsylvania. The plant manufactures flat glass for the residential and commercial construction markets. There are two furnaces at the Carlisle plant, known as Furnace 1 and Furnace 2. Furnace 1 is subject to a NOx limit of 26.75 lbs. /ton of glass produced, while Furnace 2 is subject to a NOx limit of 7 lbs/ton of glass produced. Furnace 1's NOx emissions limit was established and approved via the alternate limit petition process in 25 Pa. Code § 129.304.

As described in the petition, Furnace 2 achieved a NOx limit of 7 lbs. /ton of glass produced through the installation of control technology (including low NOx burners and a combination of an Electrostatic Precipitator (ESP) and Selective Catalytic Reduction (SCR)). The cost of installation of the control technology on Furnace 2 was in excess of any applicable thresholds for measuring the reasonableness of control technology installation. Instead, the controls were installed in as part of a good faith effort to assist Pennsylvania in achieving NOx and ozone reductions. However, the petition demonstrated that the addition of this very expensive control technology to Furnace 1 would not have any beneficial effect on reducing NOx or ozone levels.

**1. Glass Furnaces should not be included in RACT III.**

a. NOx emissions from glass furnaces are already comprehensively regulated

RACT III should not impose presumptive RACT limits on glass furnaces because glass-melting furnaces are already subject to a comprehensive industry-specific set of regulations regarding NOx emissions that were adopted in 2010. *See* 25 Pa. Code 129.301 et seq. ("Existing Glass Rules"). The Existing Glass Rules establish a comprehensive scheme of NOx emissions limits, exemptions and alternative limits, start-up, shutdown and idling requirements, compliance demonstration and recordkeeping requirements. The primary goal supporting the promulgation

of the Existing Glass Rules was to help Pennsylvania reduce ambient ozone levels and achieve ozone National Ambient Air Quality Standards (NAAQS), and thus these rules are already serving the same purpose that is the impetus for the RACT III rules. *See* 40 Pa. Bulletin 3328 (June 19, 2010). In fact, the Existing Glass Rules were specifically intended to not only help meeting the then-existing ozone NAAQS, but also potential future more stringent ozone NAAQS. *Id.* at 3331-32.

Glass furnaces were not subject to RACT II. *See* 25 Pa. Code § 129.96(a). Presumably, the decision not to subject glass furnaces to RACT II was done in recognition of the comprehensive Existing Glass Rules. The glass industry appears to be the only industry sector that is already subject to industry-specific regulation in Part 129 and is also being subjected to presumptive RACT in the RACT III proposal.

The RACT III proposal, as set forth in the PA Bulletin, offers no explanation why presumptive RACT are being proposed for glass furnaces despite the Existing Glass rules and the exclusion of glass furnaces from RACT II. Although the preamble to the RACT III proposal speaks generally of the need to reduce NOx and VOC emissions to achieve the 2015 Ozone NAAQS, it is completely silent on the need, basis or rationale for the inclusion of glass furnaces within RACT III. The inclusion of glass furnaces within RACT III, without any explanation, is arbitrary and capricious.

b. RACT III would indirectly revoke important components of the Existing Glass Rules

The NOx limits proposed for RACT III are identical with those in the Existing Glass Rules at 129.304(a). This does not mean that the RACT III rules would have no effect on existing facilities. Instead, the RACT III rules would appear to overwrite a number of provisions in the Existing Glass Rules, including the regulations regarding allowable emissions during start-up, shutdown and idling, and the provisions for alternative limits. *See, e.g.*, §§ 129.303 and .304. In all, the RACT III proposal threatens to rescind elements of the Existing Glass Rules without any recognition or notice of this effect.

Specifically, § 129.303 of the Existing Glass Rules, in combination with §§ 129.305 - .307, provide specific emissions requirements related to start-up, shutdown and idling, and provide flexibility during these operational phases. With respect to start-up in particular, the Existing Glass Rules require detailed start-up procedures. *See* 129.305. As such, these regulations recognize the complexity of managing air emissions during these periods. In contrast, the proposed RACT III regulations do not provide any accommodation for periods of start-up, shutdown or idling. Instead, the proposed 129.115(b)(1)(ii) requires that compliance with the RACT III NOx limits be measured on a 30-operating day basis, including emissions during start-up, shutdown and idling. Thus, these general RACT III provisions essentially invalidate the industry-specific regulations in § 129.303 for glass melting furnaces.

Next, in the Existing Glass Rules, § 129.304 provides a mechanism for alternative limits. As noted, Vitro's Furnace 1 received an alternative limit pursuant to the petition process established by 129.304(c)(1). The proposed RACT III rules would serve to revoke the Department's approval of the petition, and otherwise make the alternative limit provisions inaccessible going

forward. As such, the rules override site-specific conditions and concerns that have already been thoroughly evaluated by the Department.

The proposed RACT III rules should not override and essentially rescind other currently applicable rules without recognition and notice of the effect of the proposed rules, and without any explanation by the EQB as to the rationale and basis for doing so. A change to the regulation to impose a RACT program in place of existing specific industry-focused rules is arbitrary and capricious. The RACT III rules should uphold and provide for the details and nuances of the Existing Glass Rules, including §§ 303 and 304, and existing approved alternate limit petitions like that already approved for Vitro's Furnace 1.

**2. RACT III should preserve the start-up, shutdown and idling provisions of the Existing Glass Rules**

Even if glass furnaces are retained within the scope of RACT III, the components of the Existing Glass Rules that provide necessary operational flexibility during start-up, shutdown and idling should be preserved. As noted above, the proposed RACT III rules would apply the emission limits without exceptions for these periods, when it can be difficult or impossible to meet the limits.

In particular, the exemptions in the Existing Glass Rules are required during startup, shutdown and idling because the furnace temperatures during these periods are much lower than they are during normal operating conditions. Lower exhaust temperatures make it technologically infeasible to operate the SCR since there is a greater risk of forming ammonium bisulfates, which will damage the equipment. Since the control equipment cannot be operated during start-up, shutdown and idling, without damaging the equipment, it will be very difficult or impossible meet the RACT III NOx limits during these times. The 30-day averaging period for measuring compliance with RACT III NOx emission limits does not provide any relief, since start-ups can last for 3-4 weeks, shutdowns for 1-2 weeks, and periods of idling can last for more than 4 weeks.

Additionally, the RACT III NOx limits for glass furnaces do not make sense for flat glass furnaces during start-up, shutdown and idling. The NOx limits are set in terms of pounds of NOx per ton of glass pulled. However, no glass is produced when a flat glass furnace is starting-up, shutting down, or idling. As such, during these times, the concept of measuring NOx emissions in terms of glass produced is unworkable, and effectively imposes a zero emissions limit for NOx during start-up, shutdown and idling.

For these reasons, glass furnaces are different than essentially every other industry and type of emissions unit affected by presumptive RACT, in that the Department's existing rules contain specific start-up, shutdown and idling provisions, which were issued on an industry-specific basis. *See* 25 Pa Code § 129.303-307. These rules are tailored to the practical and legitimate operating needs of glass furnaces. As such, the proposed § 129.115(b)(1)(ii) that requires RACT III emission limits to apply at all times, even during start-up, shutdown and idling, inappropriately replaces the industry-specific requirements of the Existing Glass Rules with general rules that apply to all sources. An exception should be added to § 129.115(b) to allow

glass furnaces subject to existing industry-specific start-up, shutdown and idling provisions to remain subject to the specific requirements of those rules.

As noted above, the preamble to the proposed RACT III rules contains no apparent recognition that RACT III will act to negate the start-up, shutdown and idling provisions of the Existing Glass Rules, let alone an explanation of the basis for this aspect of the proposed rules. The Department's Technical Support Document[1] (TSD) is also silent on this effect of the RACT III proposed rules. Further, there is no analysis provided that hints at any attempt to evaluate what additional controls might be required to allow the achievement of the glass furnace emission limits without the ability to utilize the exemptions applicable to start-up, shutdown and idling otherwise provided by the Existing Glass Rules. The failure to explain the reasoning of the proposal, and the lack of any consideration of technical and cost issues associated with this aspect of the RACT III rules, is arbitrary and capricious.

### 3. The Technical Guidance provided by DEP inaccurately estimates the cost of NOx controls at Vitro's Carlisle Furnace 1

Although the RACT III proposal is essentially silent on the rationale behind the imposition of presumptive RACT for glass furnaces, the TSD makes assertions regarding a cost evaluation of control technologies for flat glass furnaces, and for Carlisle's Furnace 1 in particular that is incorrect. As such, the RACT III rules for flat glass furnaces should be reconsidered and revised to properly recognize the actual control costs that would be imposed if the RACT III rules are issued as proposed.

The TSD states the following:

> Most flat glass furnaces in Pennsylvania are equipped with Oxy-firing and LNB or SCR with controlled emission rate of 7 lbs./ton of glass pulled. However, one glass furnace in Pennsylvania is operating with a NOx limit of 26.75 lb/ton of glass pulled. This glass furnace is not able to meet proposed RACT III NOx limit of 7 lbs./ton of glass pulled here fore. The Department evaluated a cost-analysis for SCR for flat glass furnace and found it to be less than $1,000 approximately removed

TSD at 29. Given the reference to "one glass furnace" with a NOx limit of 26.75 lb/ton, it is clear that that the TSD is talking about Furnace 1, since that is Furnace 1's NOx limit. The TSD asserts that a cost-analysis by the Department concluded that installation of SCR would cost less than $1,000 per ton of NOx removed. Although cost analyses for a variety of industries and facilities are included in the TSD appendices, there is no supporting information for this assertion.

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[1] Available at: https://files.dep.state.pa.us/PublicParticipation/Public%20Participation%20Center/PubPartCenterPortalFiles/Environmental%20Quality%20Board/2021/May%2019/02_7-561_RACT%20III%20Major%20Source/04b_7-561_RACT%20III%20VOC_Proposed_TSD%20w%20APPENDICES.pdf

The Department appears to rely on USEPA's Control Cost Manual for some of its economic feasibility arguments but fails to recognize the following for SCR:

- USEPA's SCR cost model indicates that the model provides estimates with uncertainty ±30 percent.

- The SCR cost model is based on data from utility boilers, not glass furnaces. During a public comment period on the June 2019 revisions to the SCR chapter of the Control Cost Manual, commenters pointed out some of the reasons why investment and annualized costs may be significantly higher for other sources. Differences between SCR costs for utility boilers and other equipment can be attributable to differences in design parameters such as foundation design, catalyst temperature, residence time, temperature profiles, and heat densities.

The Department also errs in assuming that SCR, by itself, is the appropriate control technology. This is incorrect. For SCR to function reliably on a flat glass furnace, it needs to be combined with a particulate control technology. Principal methods for controlling particulates currently in use by US industries include wet scrubbers, fabric filters (baghouses), and ESP. USEPA acknowledges that ESPs are superior to wet scrubbers and baghouses for large glass furnaces. (AP42. Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. Chapter 11.15: Glass Manufacturing)

At Carlisle's Furnace 2, an ESP is used in combination with SCR technology to control NOx emissions. The ESP is necessary to reduce the particulate loading into the SCR. Particulate loading in the SCR catalyst may occur from both fuel combustion and raw materials from the process; the amount of dust loading varies depending on fuel used, source type, and raw material feeds. These particulates can mask and block the catalyst surface and inhibit the SCR NOx reduction efficiency.

ESP control technology is more expensive and costly to run than SCR controls. As such, the Department's apparent conclusion that controlling NOx emissions to an emission rate of not more than 7 lbs./ton of glass pulled would not cost more than $1,000 per ton of NOx removed is incorrect, and significantly underestimates the true costs.

There are, in fact, two additional costs that the Department failed to consider in its cost-effectiveness calculation:

- The annualized costs to operate and maintain an ESP. Using estimation algorithms in USEPA's Control Cost Manual, the annual costs to operate and maintain an ESP range from $2.8 million to $3.2 million (depending on the retrofit factor used "to quantify the unanticipated additional costs of installation not directly related to the capital cost of the controls themselves").

- The time necessary for compliance. Installation of an SCR/ESP system will require engineering design, manufacturing, installation, start-up, performance evaluation, and troubleshooting. The time necessary to complete all of these activities is approximately 24 months. The installation of SCR/ESP could not occur until the next "cold repair" of Furnace

1, when the furnace is completely shut down, all production has been suspended, and the exhaust stack is cool. The next cold repair is expected around 2033; assuming issuance of the RACT III rules in early 2022, the latest date by which controls would have to be installed, and thus Furnace 1 shut down, would likely fall in the second half of 2025. In order to avoid two shutdowns within eight years (the RACT III deadline and the end of Furnace 1's useful life), the cost to meet the RACT III deadline should include the cost of a cold repair.

The last cold repair of Furnace 2 in 2019 cost $41.2 million. (Emergency repairs of Furnace 1 in 2017-2018 do not represent true cold repair costs.) Annualizing this investment (assuming 4% of capital costs for direct and indirect annual costs and 8% capital recovery, reasonable assumptions from USEPA's Control Cost Manual) for Furnace 1 results in an annual cost of $4,944,000.

Using only the annualized cost of ESP ($2.8 million) and the annualized cost of a cold repair, the cost effectiveness for Furnace 1 to achieve a NOx emission rate of 7 lbs/ton of glass is over $5,200 per ton of NOx removed, above the Department's cost-effectiveness benchmark of $3,750 per ton of NOx removed. (Based on CY2019 NOx emissions of 2,247 tons and 66 percent NOx control efficiency to achieve 7 lbs./ton of glass from the current limit of 26.75 lbs/ton of glass.)

Cost Effectiveness = Annual Cost / Emission Reduction
Cost Effectiveness = [($2,800,000/yr + $4,944,000/yr)] / [(2,247 tons/year) * (0.66)]
Cost Effectiveness = $5,222/ton NOx

The cost effectiveness rises to over $6,200 per ton when the Department's annual cost of SCR ($1,000/ton NOx) is included.

The cost effectiveness calculation does not even include net revenue lost during furnace shutdown, which USEPA's Control Cost Manual (Chapter 2, Section 2.5.4.2: Retrofit Cost Considerations) considers a "bona fide retrofit expense". Vitro estimates that the lost revenue for a 90-day cold repair will be $9,000,000 – or $100,000 per day. Inclusion of this factor would essentially double the cost effectiveness values noted above.

**4. If Glass Furnaces are included in RACT III, more appropriate time frames are needed for installation of controls**

Flat glass furnaces are designed to run continuously. The furnace is lined with refractory brick and, once in operation, the refractory needs to remain hot. Once the furnace cools, the refractory is damaged, and the furnace needs to be rebuilt before it can be placed back in operation. This operational life cycle is not unique to glass furnaces but is typical for other industrial furnaces that utilize refractory brick.

During promulgation of the Existing Glass Rules, the House and Senate Environmental Resources and Energy Committees urged the Department not to base compliance with the rules on a specific date. *See* 40 Pa. Bulletin at 3333. The Committees noted that glass-melting furnaces could be required to be replaced or upgraded before the end of their normal life

expectancy, thereby greatly increasing compliance costs. *Id.* In response, the Department included a petition process for glass melting furnaces to seek both alternative limits and alternative compliance schedules. *Id.* This process is set forth in 25 Pa. Code § 129.304(b) and (c), and allows affected glass furnaces to seek and receive alternate compliance limits and/or schedules. This provision is not limited by the three-year maximum time frames, described below, that make the RACT III proposal unreasonable and unduly burdensome when applied to glass melting furnaces and to Furnace 1 in particular.

In the normal course of operations, the furnace and the refractory can operate for approximately 15 years until worn refractory needs to be replaced. Typically, when a furnace is shut down to accomplish a relining of the refractory and refurbishment of the furnace, the shutdown lasts approximately 90 days. If a furnace is forced to shut down ahead of schedule, before the refractory has reached the end of its useful life, the furnace will still have to be relined before it can be restarted.

The RACT III rules present a significant concern because the installation of control technology to reduce NOx emissions will require any affected furnace to be shut down in order to install the controls. Furnace 1 was last rebuilt in 2018 following a fire that greatly damaged the furnace. It is not expected to be shut down again until 2033. As such, the proposed RACT III rules present a significant concern because they do not provide a sufficient time frame for installation of controls that would avoid an otherwise unnecessary shutdown and rebuild of the furnace. The maximum time available appears to be three years after approval of a petition under 129.112(n) or 129.114(j), per the three-year periods in 129.112(n)(2)(v) and 129.114(j)(2)(v). Assuming issuance of the RACT III rules in early 2022, submittal of a petition within the required six-month time period, and reasonably prompt approval of the petition, the latest date by which controls would have to be installed, and thus Furnace 1 shut down, would likely fall in the second half of 2025. This is eight years before Furnace 1 reaches the end of its useful life.

The RACT III rules should provide sufficient flexibility for glass furnaces to allow any installation of controls necessary to meet RACT III NOx limit to occur at the next cold shutdown of an affected furnace, without accelerating the shutdown or requiring the remaining useful life of an affected furnace to be lost.

**5. The flexibility provided by key RACT III provisions should remain in the rule, and should be expanded**

As the foregoing comments demonstrate, there is the potential for every affected facility to have case-specific issues and circumstances that merit flexibility in the application of RACT III requirements. Although the proposed RACT III provisions are insufficient, as currently written, to provide for a reasonable or appropriate application of RACT III to Vitro's Furnace 1, such provisions should be maintained in any final RACT III rules. Specifically, the alternative compliance schedule option in 129.112(n), the alternative RACT requirement provisions in 129.114(d), and the alternative compliance schedule provisions in 129.114(j) should all be maintained and expanded in the final rules.

Thank you for your consideration of these comments.

Sincerely yours,

Bill Haley

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