



June 14, 2019

Michael Krause
Manager, Planning and Rules
South Coast AQMD
21865 Copley Drive
Diamond Bar, CA 91765

**Subject: Potential Impacts of SCAQMD Rule 1109.1 on Third-Party Hydrogen Supply Model
Air Products Carson (ID# 3417) and Wilmington (ID# 101656) Hydrogen Plants**

Dear Mr. Krause:

On behalf of Air Products and Chemicals, Inc. (Air Products), we thank staff for your ongoing efforts to request, and willingness to receive, stakeholder input from us on proposed Rule 1109.1 development via the larger working group, one-on-one discussions, Wilmington facility site visit, etc. We appreciate this specific opportunity to provide formal comments regarding the ongoing subject rule development. Air Products acknowledges the challenge faced by SCAQMD in determining what represents NOx Best Available Retrofit Control Technology (BARCT) for a wide variety of NOx-emitting sources including, but not limited to, source categorization, source-specific considerations and determination of control technology retrofit/installation costs. As a hydrogen manufacturer and supplier since 1975 with over 1,300 hydrogen plant operating years of experience, Air Products is in a unique position to offer key design and operating insights to inform this rulemaking effort as it applies to hydrogen production facilities.

Air Products recommends that the BARCT assessment be conducted in a **site-specific and equitable manner** across the entire hydrogen sector so as to not adversely impact our established third-party hydrogen supply business model (explained in subsequent paragraph, 'Business Model Context'). We believe this can be achieved by:

- Using **accurate and complete costs** for the cost-effectiveness analysis; including acknowledgement that retrofit control technologies may hinder a facility from operating at current production capacity. In Air Products case, this could potentially jeopardize its ability to meet contractual obligations and ultimately threaten its third-party supply model.
- Setting the BARCT emission limit without differentiating between hydrogen production processes employed, fuels and feedstocks utilized or facility ownership/structure, so that all producers of hydrogen are treated in a **consistent manner**.
- Allowing **emission intensity** as an **alternative compliance option** when assessing BARCT limits to recognize investments made in developing and operating high-efficiency and low-emitting process configurations, including co-production of power and steam.

Business Model Context

To provide context for Air Products comments, it is helpful to understand the third-party, or "over-the-fence," hydrogen supply business model used by Air Products. The model seeks to aggregate hydrogen demand from several refinery customers, and then construct and operate a larger-scale, more energy-efficient and lower overall NOx-emitting facility through replacement

of older, less efficient and higher NO_x-emitting units. This approach provides an energy efficient competitive alternative to the traditional “inside-the-fence” hydrogen production arrangement used by refineries. This exact model has been successfully employed by Air Products for both of our local Carson and Wilmington facilities, which serve multiple refinery customers. Consistent treatment under environmental regulations of both the “inside-the-fence” and the “over-the-fence” types of hydrogen production/supply options, is essential in maintaining a fair and competitive marketplace.

Air Products has invested significant capital and resources in designing, constructing and operating its local facilities to be highly integrated with their main refinery host customers – typically supplying steam and/or power to these customers in addition to hydrogen product. Co-producing steam and/or power is more efficient and results in a lower emission footprint than dedicated separate steam and/or power generation methods. Our Wilmington plant design also allows for use of waste refinery fuel gas (RFG) streams as a feedstock and fuel source, providing an optimal process by which these streams can be utilized.

Air Products Concerns Regarding Revisions to NO_x BARCT

Conducting BARCT Analysis Equitably

Air Products supports SCAQMD’s intention of assessing the cost-effectiveness of control technologies and the importance in considering incremental NO_x reductions and the full cost for retrofit technologies; meaning both the installed cost and the annualized incremental operating cost of enhanced controls. However, Air Products is concerned that in the absence of equipment-specific technical and economic feasibility considerations, the scope of potential facility changes necessary to comply with BARCT, as well as to address any associated operational/production limitations and customer supply interruptions, may not be adequately addressed. Air Products agrees with other stakeholders’ comments that there should be a case-by-case process with site-specific considerations for either determining BARCT that would apply or demonstrating that defined BARCT is not technically and/or economically feasible and therefore should not apply.

There are some enhanced NO_x control strategies that, while technically feasible, may reduce production capacity of the regulated unit, in turn jeopardizing a company’s ability to meet contractual obligations. For example, changes to an SCR system (i.e., module sizes, number of modules, catalyst type, etc.) can increase a combustion unit’s exhaust stack pressure drop sufficiently such that the capacity of the exhaust fan is exceeded, resulting in the need to replace/upgrade the fan, draft controls, motors, etc. to avoid impairment of the firing rate necessary to achieve current design production capacity. Such “downstream” impacts must be fully understood, and their costs incorporated into the assessment. This is particularly important for the third-party hydrogen supplier where any reduced ability to meet its contractual obligations would likely be replaced by operation of (typically) older, less-efficient and higher-emitting “inside-the-fence” hydrogen and steam/power production processes/units. Such an outcome would most certainly be contrary to the SCAQMD’s overall emission reduction objectives.

Air Products would echo other stakeholder comments that BARCT must be set at levels that allow the regulated entities a “margin of compliance safety” – which accounts for minor operating variability without resulting in an emission exceedance. While vendor-quoted emission levels may be generally achievable under specific conditions, sustained performance at

such levels, including transitional modes, start-up and shutdown scenarios, may not have been demonstrated in-practice. It should be noted that this variability may also be addressed through use of compliance averaging periods.

Assessing BARCT Across the Entire Hydrogen Sector

To ensure fairness, Air Products recommends SCAQMD conduct the BARCT assessment of all hydrogen production units under a single category. By segregating hydrogen production unit furnaces by fuel-type (i.e., placing those that use refinery fuel gas as a primary fuel under the Rule 1109.1 'Process Heaters' category), staff is essentially segregating older refinery-based production units from newer third-party production units. This creates an uneven playing field between the two despite the fact that they are both competing alternatives to produce the same product – hydrogen. The BARCT assessment should include the technical feasibility of enhanced controls for all hydrogen plants while considering the cost-effectiveness of the different “starting points” and associated NO_x emission reductions. This is consistent with the discussion of the general BARCT assessment process described in previous working group meetings.

Emission Intensity as an Alternative BARCT Compliance Option

Setting NO_x performance levels at specific emission endpoints does not fairly assess the “system-wide” emissions footprint of co-producing steam and/or power along with hydrogen. A more equitable means of determining BARCT would be to compare achievable emissions performance based on a production-indexed emission intensity; in this way the trade-off between alternative hydrogen, steam and/or power supply sources can be clearly understood. Air Products envisions:

- Quantifying the emission benefit(s) of a facility’s co-produced steam and/or power in the following manner:
 - **0.0062 lbs NO_x/MMBtu** exported steam; based on natural gas fired boiler (~85% efficient) at 5 ppm NO_x (3% O₂) from Rule 1146.
 - **0.0960 lbs NO_x/MWh** power generated; extrapolated from NSPS Subpart KKKK at 2 ppm NO_x (15% O₂) per Rules 1134/1135.
- Establishing an alternative BARCT compliance option on the basis of mass emissions per unit of production (i.e., **lbs NO_x/MMSCF H₂ produced**), adjusted for the quantified utilities emission benefits. Such a method would fairly recognize the most efficiently designed and operated processes.

This compliance approach would allow facilities to satisfy BARCT with greater flexibility and cost-effectiveness; a facility can improve its intensity-based efficiency/compliance by reducing emissions and/or by increasing the amount of production at a lower emission intensity, such as through energy-efficient considerations/improvements.

Air Products is very interested in continuing to participate in the discussion and assessment of NO_x BARCT for hydrogen production units. We look forward to sharing our experience, knowledge and insight in future meetings with your staff and, as appropriate, the consultant(s) who will be providing an independent review of the BARCT assessment. I plan on reaching out to you and your team in the near future to discuss scheduling. As always, please do not hesitate to contact me at your convenience at (714) 642-4252 or at reebeljc@airproducts.com. Thank you.

Sincerely,

A handwritten signature in cursive script, appearing to read "Jim Reebel".

Jim Reebel
Sr. Principal Environmental Engineer

cc: Eric Guter, Western HyCO Commercial Manager (Air Products)
Seth Gottlund, So Cal HyCO Commercial Lead (Air Products)
Barry Beasley, HyCO Government Relations (Air Products)
Roger Han, Carson and Wilmington Plant Manager (Air Products)
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