Dr. Robert (Bo) Wood
Division of Air Quality
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Re: Public Comment on R307-315 NOx Emission Controls for Natural Gas-Fired Boilers 2.0-5.0 MMBtu

Dear Dr. Wood,

A. O. Smith Corporation ("A. O. Smith" or "Company") appreciates the opportunity to provide comments on the Division of Air Quality ("Division") proposed rule R307-325 NOx Emission Controls for Natural Gas-Fired Boilers 2.0-5.0 MMBtu ("Proposed Rule") and looks forward to continuing to be a resource to the Division.

About A. O. Smith

A. O. Smith Corporation, with global headquarters in Milwaukee, Wisconsin since 1874, applies technology and energy-efficient solutions to products manufactured and marketed worldwide with operations in the U.S., Canada, China, India, Mexico, the Netherlands, Turkey, and the UK. Listed on the New York Stock Exchange (NYSE: AOS), the company is one of the world's largest manufacturers of residential and commercial water heating equipment and boilers, as well as a leading manufacturer of water treatment and air purification products. Along with its wholly owned subsidiaries, A. O. Smith is the largest manufacturer and seller of residential and commercial water heating equipment, high efficiency residential and commercial boilers, and pool heaters in North America.

Overview

The Company appreciates that the Division affords reciprocity, and alignment, of its air quality rules with those already in effect neighboring air quality management districts, which provides manufacturers with a degree of business certainty, as well as eliminating duplicative certification and testing of their equipment for compliance purposes within in the State. Regarding the equipment covered under the Proposed Rule, the Company recommends the Division align with program as promulgated by the Bay Area Air Quality Management District ("BAAQMD") certification program. The BAAQMD certification program is based on testing at specified operating conditions like those used on smaller appliances in the South Coast Air Quality Management District ("SCAQMD") certification program. The test results and data are reviewed by BAAQMD to verify that test conditions and properly

calibrated equipment were used before products are approved and added to the list of approved models is preferred approach.

Consistent with the Company's recommendation, the BAAQMD approach provides three significant benefits that are missing from the proposed regulations in the Proposed Rule.

1. Certainty for building owners.
2. Certainty for manufacturers.
3. Prioritization of Division resources.

Field Testing

Field testing of boilers will always be done after appliances are purchased and installed. Detection of a boiler that fails to meet the NOx emission levels after installation will cause a great hardship and expense for the owner and potential litigation between owners and installers. By contrast, allowing installation of products based on a list of previously certified products removes these concerns. Moreover, field testing will have variable results and may not reflect the overall performance of the boiler. Air temperature, water temperature and percentage of firing rate all have a significant impact on NOx emissions. A boiler might have substantially lower NOx emissions with cool air and water and at low firing rates than at higher temperatures and firing rate. Also, the test method and equipment will have a significant impact on the accuracy of the emissions measurement. A fixed sensor that is not properly calibrated will be much less accurate than a gas analyzer that is calibrated with a span gas before and after testing and samples flue gasses across the entire cross-section of the flue. Lab testing at controlled conditions will provide more consistent and accurate results than field testing.

BAAQMD Program

The BAAQMD has a certification program with specified test conditions, a review process and a well-maintained list of certified products, this can be used to verify compliance of low NOx emission boilers with input rates over 2.0 MMBtu with reduced use of inspection resources and no maintenance of test equipment[1]. In contrast, while the boilers over 5.0 MMBtu (and covered by the Proposed Rule R307-316) are typically industrial boilers and are often too large for laboratory testing, many of the boilers under 5.0 MMBtu are packaged boilers which can be laboratory tested and the emissions certified at standard operating conditions as evidenced by the BAAQMD list of certified equipment.

The Company is aware that the BAAQMD NOx limit for certification is 30 ppm which is considerably higher than the proposed 9 ppm limit; however, the performance gap is not as large as these numbers suggest. As stated previously, the operating conditions when a test is conducted will have a significant impact on the measured NOx emissions. By way of example, the Company has a model certified by BAAQMD, which is tested at 3 input rates (high, midpoint and low input rates) the NOx emission changed by 12.1 ppm between the different firing rates. This variation is only based on changes to input rate, with all other conditions (water temperature, flow rate and ambient conditions)

[1] https://www.baaqmd.gov/permits/register-equipment/boiler-certification-program

being controlled. Uncontrolled field tests can cause even greater variation. A boiler that passes a field test at 9 ppm NOx at one operating condition could emit 21.1 ppm NOx or more at another operating condition.

Additionally, the BAAQMD test in question was conducted using a highly accurate NOx analyzer and the readings corrected against readings of a certified span gas (verified NOx concentration). The measurement of NOx was taken with the boiler at steady state and with the sampling probe drawn across the entire width of the vent in two perpendicular axis to get an accurate reading of the emissions. It is unlikely that any of these procedures will be reproduced in field testing, which will amplify the inaccuracies of the measurement.

Finally, BAAQMD certified equipment[2] has on average a NOx emission of 30 ppm or less which is confirmed over a range of inputs with a specific procedure, equipment and review by BAAQMD personnel. By contrast, field testing will be done with less precise equipment, no control over operating conditions and at a single condition. In other words, the measurement uncertainty of field testing is much greater than that of a BAAQMD certified NOx measurement. Field testing will allow some operation over the regulated limits that will not be detected due to inaccuracies and variation in operating conditions.

Conclusion

For the reasons cited above, the Company encourages the Division to reconsider the Proposed Rule and replace the field-testing requirement with the requirement that Natural Gas-Fired Boilers 2.0-5.0 MMBtu approved and listed by the BAAQMD Boiler Certification Program meet the Division's requirements for installation in the State. A. O. Smith looks forward to working with the Division as it further considers its Proposed Rule.

Best Regards,

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[2] https://www.baaqmd.gov/~/media/Files/Compliance%20and%20Enforcement/Compliance%20Assistance/9-7%20Cert/9-7_Certification_List_Master.ashx?la=en