



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
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MODEL CLEARINGHOUSE MEMORANDUM

Subject: Concurrence Request – Approval of Ambient Ratio Method 2 (ARM2) Default AERMOD Option for Hankook Tires Facility NO₂ Ambient Impact Analysis

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Date: 30 November 2015

To: George Bridgers, Director of Model Clearinghouse
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The environmental consultant Environmental Resources Management (ERM) has requested the use of the AERMOD non-default option ARM2 for the ambient NO₂ impact assessment supporting a PSD permit application for a Hankook tire manufacturing facility in Clarksville, TN. The use of non-default AERMOD options requires EPA Regional office approval with Model Clearinghouse concurrence. The purpose of this memorandum is to obtain Model Clearinghouse concurrence with our acceptance of this request for this project specific use of AEROD non-default option ARM2.

[Note: This assessment is only applicable to the use of the non-default AERMOD ARM2 option for this specific PSD application's impact assessment. The ARM2 procedure should be considered with other aspects of the proposed PSD permit modeling protocol when assessing the overall modeling analysis.]

The EPA 30 September 2014 Clarification Memorandum ("Clarification on Use of AERMOD Dispersion Modeling for Demonstration Compliance with the NO₂ National Ambient Air Quality Standard", R. Chris Owen and Roger Brode) discusses the ARM2 option and provides guidelines under which its application would be appropriate. These guidelines address the magnitudes of the important parameters (i.e., primary in-stack NO₂/NO_x ratios (ISR), project full conversion NO₂ impact, and background ozone concentration) that must be considered in determining the appropriateness of ARM2 for an application. The ERM justification document provided the following project associated information on these applicability parameters.

The initial parameter discussed in the EPA 30 September 2014 Clarification Memorandum is the Tier 1 total conversion modeling for the primary source (i.e., proposed Hankook project). If the Tier 1 impact assessment for the primary source is less than 150-200 ppb (282-376 µg/m³) then ARM2 procedure should provide conservative ambient impacts if the NO₂/NO_x ISR are less than the Tier 3 recommended default ratio of 0.5. Because of the role ozone has in this analysis, further guidance is provided concerning the dependence of the threshold Tier 1 concentration on the background ozone levels. The lower end of the threshold concentration (i.e., 150 ppb) is appropriate in areas of higher background ozone while the higher threshold values appropriate for areas with lower background ozone concentrations.

Given this guidance, the project specific information on these parameters are addressed in the following sections.

Facility Full Conversion NO₂ Impact – The following comments are associated with the estimate of project ambient NO₂ impacts assuming full conversion of NO_x emissions.

- The facility-wide impact assessment assuming the Tier 1 procedure (i.e., full conversion of NO_x to NO₂) was performed for two operating scenarios; all air handling units (AHU) operating at 80% load and a second with the AHU operation at 100%.
- The NO₂ modeled concentrations from a Tier 1 analyses yields the 98th percentile of the maximum daily 1-hour concentrations (i.e., design values), averaged over 5 years, of 196.25 µg/m³ for 100% peak load and 159.64 µg/m³ at 80% peak load. The maximum 100% load concentration was 512.46 µg/m³.
- Based on the EPA Clarification Memorandum, the ARM2 procedure would be applicable for projects with ambient NO₂ impacts in the range of 150-200 ppb (282-376 µg/m³); with the lower values associated with higher background ozone values and higher ambient NO_x concentrations with lower background ozone values.
- Because the maximum Tier 1 project impacts are greater than the threshold values, the in-stack NO₂/NO_x ratios for each project emission source, and the background ozone concentrations are considered.

Project Background Ozone Concentration – Given the large Tier 1 project impacts, the following comments address the representative ambient background concentration.

- The TN Division of Air Pollution Control provided justification for the selected Kentucky/Christian County/Hopkinsville rural ozone monitor as representative of project background concentrations (i.e., 2012-2014 design value of 67 ppb).
- This background ozone value is less than the indicated acceptable range (i.e., 80-90 ppb) when background ozone could cause Tier 3 and actual NO₂/NO_x ratios to be greater than with ARM2 ratios. Therefore, the ARM2 procedure for this application should provide conservative results.

In-stack NO₂/NO_x Ratios (ISR) – The project's NO₂/NO_x ISR are of concern because of the project's large Tier 1 total conversion impacts even though the representative ozone background concentration is low. Therefore, the following provides information on the proposed facility ISR.

- The PSD application is for a new greenfield facility so no site specific stack tests could be performed.
- The Hankook NO_x emission units consist of four boilers where only three may operate at any one time. The combined maximum daily firing rate of the boilers is 101 MMBtu/hour. Additionally, there are proposed 130 air handling units with heat input rating ranging from 0.08 to 4.6 MMBtu/hour and a combined heat input of 212.35 MMBtu/hour.
- The boilers and air handling units will be natural gas fired except under periods of curtailment. Only two of the boilers can burn both natural gas and #2 fuel oil. Natural gas was indicated to be 99% of the annual operation. Given these operating characteristics, normal operation will not produce fuel based NO_x in the firing process.
- Hankook reviewed the EPA NO₂/NO_x ISR Database for natural gas boilers to determine representative ISR from reported similar sources. The database contained 42 natural gas fired boilers. There were no ISR for natural gas fired boilers greater than 0.2. The maximum ISR for natural gas fired boilers in this database was 0.1579. Based on the maximum ISR from similar emission sources from this database, Hankook will set the minimum ARM2 ISR to 0.2.

- For all NO_x emission units of nearby facilities/sources that will be included in cumulative modeling assessments, the default value of 0.5 ISR will be used.

Conclusions

EPA Region 4 believes the above proposed ARM2 application procedures and provided basis demonstrate the appropriateness of the use of ARM2 AERMOD Option for this project. Although the full conversion maximum project impact is greater than the guideline threshold values, the low representative background ozone concentration, and estimated project minimum NO₂/NO_x ISR developed from the EPA NO₂/NO_x ISR Database are within the guidance provided in the 30 September 2014 Clarification Memorandum. Therefore, we believe the provided justification demonstrates the non-default ARM2 AERMOD option would be appropriate for the required ambient impact assessment supporting a PSD permit application for this proposed project.

