UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
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MEMORANDUM

Subject: Concurrence Request – Approval of Ambient Ratio Method 2 (ARM2) Default AERMOD Option for the Indorama Ventures Olefins LLC NO_2 Ambient Impact Analysis

From: Jeffrey Robinson, Chief
Air Permits Section, Region 6

Date: April 27, 2016

To: George Bridgers, Director of Model Clearinghouse
Air Quality Modeling Group, Office of Air Quality Planning and Standards

Environmental Resources Management Southwest, Inc. (ERM) has requested the use of the AERMOD non-default option ARM2 for the ambient NO_2 impact assessment supporting a PSD permit application for the Indorama Ventures Olefins facility in Westlake, Calcasieu Parish, Louisiana. 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 September 30, 2014 Clarification Memorandum ("Clarification on Use of AERMOD Dispersion Modeling for Demonstration Compliance with the NO_2 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 NO_2/NO_X ratios (ISR), project full conversion NO_2 impact, and background ozone concentration) that must be considered in determining the appropriateness of ARM2 for an application.

The ERM prepared modeling protocol for the Indorama facility provided the following project associated information on these applicability parameters.

The initial parameter discussed in the EPA September 30, 2014 Clarification Memorandum is the Tier 1 total conversion modeling for the primary source (i.e., proposed Indorama facility). If the Tier 1 impact assessment for the primary source is less than 150-200 ppb (282-376 $\mu g/m^3$) then

ARM2 procedure should provide conservative ambient impacts if the NO_2/NO_X ratios 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 NO_2 Impact - The following comments are associated with the estimate of project ambient NO_2 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 NO_2) was performed to predict the maximum predicted NO_2 concentrations.
- The NO_2 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 44.1 $\mu g/m^3$.
- Based on the EPA Clarification Memorandum, the ARM2 procedure would be applicable for projects with ambient NO_2 impacts in the range of 150-200 ppb (282-376 $\mu g/m^3$); 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 less than the threshold values, the in-stack NO_2/NO_X ratios for each project emission source, and the background ozone concentrations consideration is not required. However, ERM did provide information regarding background ozone to further support the use of ARM2, summarized below.

Project Background Ozone Concentration - The following comments address the representative ambient background concentration.

- ERM provided monitored data from the Vinton, Louisiana monitor (AQS ID 22-019-0009) located in Calcasieu Parish as representative of project background concentrations.
- The background hourly ozone concentrations from this monitor are typically less than the indicated acceptable range (i.e., 80-90 ppb) when background ozone could cause Tier 3 and actual NO_2/NO_X ratios to be greater than with ARM2 ratios. Therefore, the ARM2 procedure for this application should provide conservative results.

In-stack NO_2/NO_X Ratios (ISR) – As previously stated, the project's Tier 1 total conversion impacts are below the threshold of concern, however, ERM did provide information regarding the source's ISR as part of their ARM2 justification document. The following summarizes the information provided on the proposed facility ISR.

- The PSD application is for a new major source so no site specific stack tests could be performed. Indorama is proposing to recommence operations of an existing, non-operational facility.

- The Indorama NO_X emission units consist of three boilers, three flares, eight cracking furnaces, and one dryer regeneration. The combined maximum daily firing rate of the boilers is 17,400 MMBtu/day, and emissions from the boilers account for over 60% of the short-term NO_X emissions for the facility.
- The boilers will be fired with fuel gas, the hourly emission rate for modeling purposes was considered to be as natural gas operation.
- Indorama conducted a review of the EPA NO_2/NO_X ISR Database to determine representative ISR for the boilers 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, Indorama concludes that the facility's boilers will have a NO_2/NO_X ISR of less than 0.2.
- Indorama was unable to locate ISR information in the EPA's database for the remaining on-site sources. They set the ARM2 minimum NO_2/NO_X ratio of 0.5 to balance this lack of ISR information with the fact that the majority of the short-term NO_X emissions (over 60%) are from the boilers which will have ISR of less than 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 6 believes the above proposed ARM2 application procedures and provided basis demonstrate the appropriateness of the use of ARM2 AERMOD option for this project. As discussed above, the full conversion maximum project impact is less than the guideline threshold values provided in the September 30, 2014 Clarification Memorandum. The applicant also provided additional information regarding the low representative background ozone concentration and estimated project minimum NO_2/NO_X ISR developed from the EPA NO_2/NO_X ISR Database to justify the use of ARM2 for the proposed Indorama project. 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.