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 Sundrop Fuels Louisiana LLC – Rapides Station Fuels Facility NO_2 Ambient Impact Analysis

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

Date: August 1, 2016

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

Ramboll Environ 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 Sundrop Fuels Rapides Station Fuels Facility in Boyce, Rapides 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.

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 Ramboll Environ prepared a justification package, Justification for Using the ARM2 Option in AERMOD for Sundrop Fuels Louisiana LLC Rapides Station Fuels Facility, included as an attachment to this memorandum. The Ramboll Environ ARM2 justification provided the following project associated information on these applicability parameters discussed in the EPA September 30, 2014 Clarification Memorandum.

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., Sundrop Fuels Rapides Station Fuels 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 28.8 $\mu g/m^3$.
- 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 are not required. However, Ramboll Environ did provide information regarding background ozone to further support the use of ARM2, summarized in the next two sections.

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

- Ramboll Environ provided monitored data from the Monroe, Louisiana monitor (AQS ID 22-073-0004) located in Ouachita Parish as representative of project background concentrations. In addition, Louisiana Department of Environmental (LDEQ) provided the following information regarding the maximum hourly concentrations at this monitor for the most recent 5 years of monitoring data (2011 to 2015).

	Maximum Hourly O_3 Concentration (ppb)
2011	69
2012	71
2013	76
2014	69
2015	68

- The background hourly ozone concentrations from this monitor are 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, Ramboll Environ 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 Rapides Station Fuels Facility NO_X emission units consist of gas heaters, auxiliary and utility boilers, a reformer, a thermal oxidizer, a fire water pump, an emergency generator, flares, and the Biomass Reforming Reactor (BRR) system.
- Site-specific and/or manufacturer information regarding the in-stack ratios of the on-site emission sources at the Rapides Station Fuels Facility was not available. Therefore, Ramboll Environ conducted a review of the EPA's NO_2/NO_X ISR Database to determine representative ISRs based on the in-stack ratio information for source groups most similar to the facility's on-site emission sources. The following table, taken from Ramboll Environ's ARM2 justification submittal, summarizes their findings.

Facility Source Description	ISR Database Category	# Entries	Min Ratio	Max Ratio	Average Ratio
Reformer[1]	Boilers	14	0.0009	0.018	0.0073
Gas Heaters[1]	Boilers	14	0.0009	0.018	0.0073
Thermal Oxidizer[1]	Boilers	14	0.0009	0.018	0.0073
Emergency Generator (Original table in justification document incorrectly labeled this as being a diesel generator.)	Reciprocating IC Engine – Natural Gas	2249	3E-05	1.0	0.128
Fire Pump	Reciprocating IC Engine – Diesel	40	0.0220	0.2211	0.0655
Auxiliary and Utility Boilers	Boilers	14	0.0009	0.018	0.0073
Flares[2]	N/A	0	N/A	N/A	N/A
BRR System[3]	N/A	0	N/A	N/A	N/A

Notes:
[1] These sources are assumed to have similar combustion characteristics to boilers.
[2] No ISR data are available for flares; however, these flares' contributions to the modeled concentrations are very small/insignificant.
[3] No ISR data are available for the BRR System. While one other biomass combustion source was listed in the database, it involved the incineration at a waste water treatment plant, and would not be applicable to this process due to difference in operation between these two units.

- As shown, the average ratio value for the representative ISRs for facility sources with identified similar source group categories are less than 0.2. Note: similar source groups were not identified for the on-site flares or BRR system.
- Regarding off-site sources, Ramboll Environ reviewed inventory source information and determined that the nearest significant offsite source was located just over 3 km away and the nearest offsite source with maximum modeled concentrations greater than the SIL is

located approximately 11 km from the Sundrop Fuels facility. Based on these distances and EPA's guidance for modeled ISR for off-site sources, Ramboll Environ stated that the use of 0.2 for off-site sources is justifiable.

- While Ramboll Environ indicated that a modeled ISR of 0.2 is justifiable based on available representative ISR information for on-site emissions sources and the distance to off-site sources being greater than 3 km, they proposed the conservative approach to conduct the NO_2 modeling using the default ISR of 0.5 for all modeled sources (both onsite and offsite).

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 concentrations and estimated project minimum NO_2/NO_X ISRs developed from the EPA NO_2/NO_X ISR Database to justify the use of ARM2 for the proposed Sundrop Fuels 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.

[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.]

Attachment: Justification for Using the ARM2 Option in AERMOD for Sundrop Fuels Louisiana LLC Rapides Station Fuels Facility

RAMBOLL ENVIRON

ENVIRONMENT
& HEALTH

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Justification for Using the ARM2 Option in AERMOD for
Sundrop Fuels Louisiana LLC
Rapides Station Fuels Facility
AI No. 182519

Date April 29, 2016

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Dear Ms. Olmos,

Please find enclosed for your review an addendum describing our justification for using the ARM2 methodology for the NO_x-to-NO_2 conversion for the NAAQS modeling analysis. This addendum is our follow-up to the previously submitted *Air Modeling Protocol in Support of a Prevention of Significant Deterioration Permit Application for Rapides Station Fuels Facility* for Sundrop Fuels Louisiana LLC (Sundrop Fuels) that was submitted on April 19, 2016.

We would appreciate your expedited review of this justification and notification of your acceptance at your earliest convenience. If you have any questions, please feel free to contact me at (225) 408-2692 or via email at claffoon@ramboll.com.

Sincerely,

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c: Penny Welch, Sundrop Fuels

Sundrop Fuels Louisiana LLC
Air Dispersion Modeling in Support of PSD Permit Modification Application
Justification for Using the Ambient Ratio Method 2

On April 12, 2010, a new 1-hour National Ambient Air Quality Standard (NAAQS) for nitrogen dioxide (NO_2) became effective after being promulgated by the United States Environmental Protection Agency (USEPA or EPA) earlier in the year. Compliance with the 1-hour and annual NAAQS for NO_2 must be addressed in New Source Review (NSR) and other air permitting actions. Though the NAAQS is based on NO_2 concentrations, the majority of nitrogen oxides (NO_X) emissions are in the form of nitric oxide (NO) rather than NO_2. NO is primarily converted to NO_2 in the atmosphere in the presence of ozone. The ambient ratio method 2 (ARM2) is an option within EPA's preferred guideline air quality model AERMOD that directly addresses the conversion, and is proposed for use in the modeling to be conducted for the Sundrop Fuels PSD Permit Modification for the Rapides Station Fuels Facility (Facility).

This memorandum presents the justification for the use of ARM2 for the Facility. A brief summary of the ARM2 method is included in the first section of this memorandum. The second section explains how the use of ARM2 for this Facility meets the criteria outlined by EPA for approving the application of ARM2 (EPA 2014). The third section addresses why the use of ARM2 meets the five criteria for accepting an alternative model (USEPA 2005).

ARM2 Background

The EPA has published several guidance documents to clarify the applicability of the *Guideline on Air Quality Models* (40 CFR Part 51, Appendix W, generally referred to simply as Appendix W, USEPA, 2005). Section 5.2.4 of Appendix W outlines a three tiered approach to estimating modeled NO_2 concentrations.

- Tier 1 – assume full conversion of NO to NO_2;
- Tier 2 – multiply Tier 1 results by empirically derived NO_2/NO_X ratios (ARM and ARM2) (ARM was used for the Facility's Significant Impact Analysis (SIA)); and
- Tier 3 – detailed screening methods may be used on a case-by-case basis, such as the Ozone Limiting Method (OLM) and the Plume Volume Molar Ratio Method (PVMRM).

AERMOD is specified as the preferred model for regulatory applications in Section 4.2.2 of Appendix W and is the preferred model for NO_2 modeling.

The original ARM is based on the work of Chu and Meyer (Chu & Meyer, 1991) and is focused on long-term averages of NO_X concentrations. The basis for the approach assumes that for long-term averages, the partitioning of NO and NO_2 at any location is controlled by the NO/NO_2 partitioning in the ambient background air because: 1) plumes are mixing with ambient air, and 2) as plumes photochemically age, they will ultimately approach the background equilibrium.

ARM applies a national default NO_2/NO_X ratio of 0.75 for the calculation of the annual standard and, as specified in U.S. EPA, 2011, 0.80 for the calculation of the hourly standard. Additionally, regional NO_2/NO_X ratios representative of area wide quasi-equilibrium conditions may be applied as default ratios under Tier 2, provided that the ambient data meets the guidelines specified in Appendix W.

The updated ARM2 was developed by the American Petroleum Institute (Podrez, 2015) and is focused on short-term (i.e., hourly) averages of NO_2 concentrations. The basis for the approach assumes that due to the nature of NO_X chemistry and typical NO_2/NO_X emission ratios, that the ambient NO_2/NO_X ratios will exhibit a predictable pattern, which will in large part, be a function of the total NO_X present. The empirical equation used in ARM2 to calculate the NO_2/NO_X rations is based on an evaluation of ten years of NO_2/NO_X ratios from the EPA's Air Quality System (AQS) record of ambient air quality data.

Although the EPA has proposed to adopt ARM2 as a default Tier 2 option at the 11th Conference on Air Quality Modeling, the method is currently classified as a non-default beta option in AERMOD and requires agency approval.

JUSTIFICATION FOR ARM2

EPA published a clarification memorandum on September 30, 2014 that addressed requirements for justifying the use of ARM2 in AERMOD (USEPA 2014). The memorandum made the following recommendations with respect to the use of ARM2:

> *The EPA testing and evaluation of the ARM2 method indicates that ARM2 appears to be an appropriate Tier 2 NO_2 modeling method in some cases and should be approved for usage as an alternative modeling option in these cases. These cases are:*
>
> 1. *The primary source/facility has made a demonstration that the source/facility has a NO_2/NO_X in-stack ratio (ISR) of less than 0.2 (for 95% or more of the short-term NO_X emissions).*
> 2. *The primary source/facility has made a demonstration that the total modeled NO_X from the source/facility is less than 150-200 ppb.*
> 3. *The background ozone is not persistently above approximately 80-90 ppb.*
>
> *If these conditions are not met, then ARM2 may underestimate ambient NO_2/NO_X ratios and so either a Tier III approach should be utilized or ARM2 should be applied with additional caution/considerations.*

The memorandum further states that:

> *The NO_2/NO_X ISR is an important input to the OLM and PVMRM Tier 3 methods and should also be considered in determining the appropriateness of application of the Tier 2 ARM2 method. Site or source specific values of the ISR are the preferred input and to facilitate the increased availability of more representative ISRs, the EPA launched a voluntary effort to collect and make available ISRs from a wide variety of sources. However, when site or source specific values are not available, a default ISR of 0.5 may be used for the primary*

source and a default ISR of 0.2 may be used for more distant sources (greater than 1-3 km).

None of these factors constitute a single deciding factor for the approval of ARM2, but represent elements of a weight-of-evidence approach in considering its appropriate application. We will address each criteria in reverse order.

Background Ozone

The USEPA sensitivity tests "indicated that background ozone concentrations of 80-90 ppb was an approximate threshold to determine when background ozone could cause actual NO_2/NO_X ratios to exceed the ARM2 ratios. Thus, nominally, if there are frequently multiple days (e.g., more than 7) with hourly ozone greater than 80-90 ppb during a typical year, then caution should be used when applying ARM2." (USEPA 2014)

Ramboll Environ examined maximum hourly ozone data for the Monroe, LA monitoring Station from 2011 to 2015. Over the five years of data examined for this site, the highest eight-hour concentration was 70 ppb. Therefore, it seems unlikely that background ozone concentrations in the Facility area would persistently be greater than 80 to 90 ppb.

Total Modeled NO_X

According to the EPA clarification memo, "(t)he Tier 1, total conversion, results from modeling the primary source can be used to determine if the primary source is likely to have ambient impacts that are appropriately conservative when using ARM2 regardless of the ISR of the primary source. The EPA sensitivity study indicates that this threshold is around 150-200 ppb of total modeled NO_X concentrations. Given the role of ozone in the EPA tests, the lower end of the threshold (150 ppb NO_X) would be appropriate in areas with higher background ozone concentrations and the higher end of the threshold (200 ppb NO_X) may be appropriate in areas with lower background ozone concentrations. In such a case, no documentation of the source's ISR would need to be provided, though it would be preferred." (USEPA 2014)

As discussed in the previous section, the Facility is situated in an area with predominantly lower ozone concentrations. Ramboll Environ modeled emissions from the proposed Facility using the Tier 1 full NO_X conversion methodology. The resulting hourly total NO_X design concentration was 15.3 ppb (28.8 $\mu g/m^3$)[1]. The details of the Air Quality Impacts Analysis and the supporting modeling files will be included as part of the revised Initial Title V and PSD Application soon to be submitted. The resulting NO_X concentrations were much less than the higher end of the applicability threshold (applicable for lower background ozone areas, such as this).

It seems likely that ARM2 would predict appropriately conservative results regardless of the ISR of the primary source. It should also be noted that the maximum areas of impact are at, or

[1] The design concentration for total NOx was calculated using the same method as for NAAQS NO_2 compliance – a three year average of the 98th percentile of daily maximum one hour averages.

near, the facility boundary. As a result, NO emissions would have limited time to convert to NO_2 prior to reaching the areas of maximum impact.

In-Stack Ratio

Although documentation of the ISR is not required due to the predicted total NO_X concentrations using Tier 1, the ISRs of the sources were examined. There is no site-specific or manufacturer information available for the NO_2/NO_X in-stack ratio for the natural gas/fuel-oil turbines. As a result, it is not possible to definitively demonstrate that the ISR is less than 0.2. However, data from the EPA ISR Database were examined for the source groups most similar to those proposed for the Facility. Ramboll Environ examined the primary database, which is the file that contains the NO_2 ISR data that has been submitted via the formal collection initiated by the Office of Air Quality Planning and Standards (OAQPS). Table 1 contains a summary of the EPA ISR primary database information for similar sources.

Table 1
Summary of EPA's ISR Values

Facility Source Description	ISR Database Category	# Entries	The Min Ratio	Max Ratio	Ave Ratio
Reformer[1]	Boilers	14	0.0009	0.018	0.0073
Gas Heaters[1]	Boilers	14	0.0009	0.018	0.0073
Thermal Oxidizer[1]	Boilers	14	0.0009	0.018	0.0073
Emergency Diesel Generator	Reciprocating IC Engine – Natural Gas	2249	3E-05	1.0	0.128
Fire Pump	Reciprocating IC Engine - Diesel	40	0.0220	0.2211	0.0655
Auxiliary and Utility Boilers	Boilers	14	0.0009	0.018	0.0073
Flares[2]	N/A	0	N/A	N/A	N/A
BRR System[3]	N/A	0	N/A	N/A	N/A

Notes:
[1] These sources are assumed to have similar combustion characteristics to boilers.
[2] No ISR data are available for flares; however, these flares' contributions to the modeled concentrations are very small/insignificant.
[3]No ISR data are available for the BRR System. While one other biomass combustion source was listed in the database, it involved the incineration of solids at a waste water treatment plant, and would not be applicable to this process due to differences in operation between these two units.

For most equipment, the maximum ISRs gathered from the Primary ISR Database are generally less than 0.2 (20%), with the exception of the reciprocating ICE engines, which will operate less than 100 hours per year. For all equipment with data in the inventory, the average ratio is less than 0.2. While no applicable data is available for flares or BRR system, the data available for other onsite sources indicate that assuming an NO_2/NO_X in-stack ratio of 0.2 for the Facility

sources is justifiable and likely overestimates the actual values, indicating that the ARM2 method will be applicable in this case.

For offsite sources, the EPA believes that a NO_2/NO_X in-stack ratio of 0.2 can be used for more distant sources, generally greater than one to three kilometers away from the primary source (EPA 2014). For this analysis, Ramboll Environ gathered a list of significant offsite NO_2 contributors near the Sundrop Fuels facility, to determine the quantity of sources at a distance of less than two kilometers (the midpoint of the proposed range). It was determined that there are no emitters of NO_X within tis range, with the nearest source being the Trunkline McNutt Compressor station, just over 3 km away. The nearest source that was shown to be a significant contributor (maximum modeled concentration > SIL) was the CLECO Brame Energy Center, some 11 km from Sundrop Fuels. Thus, the data analysis shows that assuming an NO_2/NO_X in-stack ratio of 0.2 for all of the offsite sources is justifiable.

While it can be shown that an in-stack ratio of 0.2 would be applicable for all onsite and offsite sources, Ramboll Environ is proposing that modeling be conducted using the default in-stack ratio of 0.5 for all sources. This should make the analysis even more conservative, ensuring that the model will not under predict the conversion of NO_X to NO_2.

JUSTIFICATION FOR NON-DEFAULT MODEL SELECTION

Generally, the justification for using a non-default approach should be developed in accordance with Appendix W (Section 3.2.2.e) which states that “an alternative refined model may be used provided that:

1. The model has received a scientific peer review;
2. The model can be demonstrated to be applicable to the problem on a theoretical basis;
3. The databases which are necessary to perform the analysis are available and adequate;
4. Appropriate performance evaluations of the model have shown that the model is not biased toward underestimates; and,
5. A protocol on methods and procedures to be followed has been established.”

These five conditions may not apply directly to the use of a beta technique embedded in a model that is a preferred model (as opposed to literally using a different model), but they are being addressed as part of the overall justification for using ARM2.

<u>Condition 1: The model has received a scientific peer review</u>

ARM2 has been scientifically peer reviewed (Podrez, 2015). It was presented at several modeling forums including the 10th and 11th Modeling Conferences and the 2013 EPA Regional/State/Local Modeler's Workshop in Dallas, Texas with documentation available in the respective dockets and the SCRAM website.

<u>Condition 2: The model can be demonstrated to be applicable to the problem on a theoretical basis</u>

ARM2 was developed to properly account for the conversion of NO_X emission to ambient NO_2 concentrations. The formula used in ARM2 was derived from a large quantity of actual measurements of this conversion. ARM2 has been developed and demonstrated to be applicable to the analyses proposed as part of the permit application.

Condition 3: The databases which are necessary to perform the analysis are available and adequate

The databases necessary to perform an analysis with ARM2 are identical to those that are required to run AERMOD in general. Further, the ARM2 analyses for the proposed Facility will be discussed in full in a modeling report and be accompanied by the supporting model input files (including meteorology). Therefore, the databases which are necessary to perform the analyses are (or will be) available and adequate.

Condition 4: Appropriate performance evaluations of the model have shown that the model is not biased toward underestimates

Appropriate model performance evaluations have been performed by the American Petroleum Institute (Podrez, 2015) and the USEPA (2014). The conditions that were identified in their analyses that help ensure the model is not biased toward underestimates have been assessed in previous sections of this report.

Condition 5: A protocol on methods and procedures to be followed has been established

A modeling protocol is submitted with this addendum and a modeling report will be developed for this analysis.

PREVIOUS APPROVAL

ARM2 has been approved by the Model Clearinghouse for three different ambient impact assessments as of the date of this document. It was approved for use for the Corning Diesel Manufacturing Facility (USEPA Model Clearinghouse, 2015), the Hankook Tires Facility NO_2 Ambient Impact Analysis (USEPA Model Clearinghouse, 2015b), and the Indorama Facility NO_2 Ambient Impact Analysis (USEPA Model Clearinghouse, 2016). In each instance, approval was based on the same analyses and criteria as presented in this justification.

CONCLUSION

We believe that the use of the ARM2 methodology meets the criteria for accepting an alternative model as outlined in Appendix W. Furthermore, we believe that ARM2 is an appropriate Tier 2 NO_2 modeling method for this case and should be approved for use.

REFERENCES

EPA Region 2 (Colecchia, A.), Request to Approve the Use of the Beta ARM2 Technique for the Corning Diesel Manufacturing Facility in Steuben County, New York, June 2015.

ERM, 2015. "Air Quality Modeling Analysis Modeling Report Prepared for Corning Diesel Manufacturing Facility", May 2015.

Podrez, M., 2015, An update to the ambient ratio method for 1-h NO2 air quality standards dispersion modeling. Atm. Env., 103, 163-170.

USEPA, 2005. Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions; Final Rule, 40 CFR Part 51, November 2005.

USEPA, 2011. "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 NAAQS", March 1, 2011.

USEPA, 2014. "Clarification on the Use of AERMOD Dispersion Modeling for Demonstrating Compliance with the NO2 National Ambient Air Quality Standard", U.S. EPA, Research Triangle Park, NC, 2014.

USEPA, 2015. Technical support document (TSD) for NO2-related AERMOD modifications, EPA-454/B-15-004, July 2015.

USEPA Model Clearinghouse, 2015. Model Clearinghouse Review of the Use of the Beta ARM2 Technique for the Corning Diesel Manufacturing Facility in Steuben County, New York. July 2015.

USEPA Model Clearinghouse, 2015b. Model Clearinghouse Review of the Use of the Beta ARM2 Technique for the Corning Diesel Manufacturing Facility in Steuben County, New York. July 2015.

USEPA Model Clearinghouse, 2016. Model Clearinghouse Review of the Use of the Ambient Ratio Method 2 (ARM2) Default AERMOD Option for Indorama Facility NO_2 Ambient Impact Analysis. April 2016.