

MEMORANDUM

SUBJECT: Request to Approve the Use of the Beta ARM2 Technique for the
Corning Diesel Manufacturing Facility in Steuben County, New York.

FROM: Annamaria Colecchia, Environmental Scientist *Annamaria Colecchia*
Permitting Section, Air Programs Branch, Region 2

DATE:

JUN 18 2015

THRU: Richard Ruvo, Chief *Richard Ruvo*
Air Programs Branch, Region 2

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

In July 2014 with subsequent revisions in February and May 2015, the Corning Diesel Manufacturing facility submitted a modeling protocol to use the beta Ambient Ratio Method 2 (ARM2) technique to demonstrate compliance with the NO₂ NAAQS and increment in support of a PSD permit modification. As you know, the ARM2 technique was first developed by the American Petroleum Institute (API) and is now allowed for use in regulatory applications as a beta technique within the EPA approved AERMOD dispersion model. Since the technique is currently in beta form, it requires the approval of the Regional Office in consultation with the Model Clearinghouse to ensure technical integrity.

Region 2 would like to approve the use of this beta technique in this case for reasons given below and seeks your concurrence. This request is only for the acceptability of the ARM2 technique and not the overall modeling analysis which is still under review.

As you know, the September 30, 2014 EPA clarification memo introduced the ARM2 method as a beta technique which could be considered in assessing NO₂ impacts and provides some guidelines under which it may be approved for use. These guidelines include cases where the primary source's in-stack ratio (ISR) of NO₂/NO_x is less than 0.2, the impacts due to full conversion of NO_x to NO₂ are less than 150 – 200 ppb, and the background ozone is not persistently above 80-90 ppb.

In this case, there are multiple stacks with multiple ISRs some of which are greater than 0.2 and some of which vary significantly through its operating cycle. There are a few cases where the NO_x full conversion impacts are greater than 200 ppb (around 1%). The ozone concentrations do tend to be less than 80 ppb. The September 30th clarification

memo recognizes that these are not bright lines but rather recommends that a user consider more fully the details of the specific case for acceptable application of ARM2 outside of these parameters.

ARM2 is proposed in this case largely due to the fact that the ISR of some of its more controlling units vary substantially during its operation. The applicant proposes to use ARM2 since it addresses variability indirectly by using an empirically derived ambient ratio that varies with respect to the corresponding NO_x full conversion impact.

The applicant provides, and EPA Region 2 agrees with the following reasons to justify the use of ARM2 in this case:

- ARM2 allows for a variability in the NO₂/NO_x ambient ratio rather than a single ratio.
- Impacts should be conservative since many of the sources do not operate continuously or simultaneously.
- Ambient measurements used in the ARM2 derivations are more conservative than recent measurements.
- An independent evaluation of the API basis for the development of ARM2 shows that the method is conservative with respect to ambient ratios for sites with similar rural settings as this facility.
- The travel time to maximum impacts are short thus not allowing much time for ozone entrainment.
- Maximum NO_x impacts tend to occur at night while maximum ozone concentrations occur in the mid-day.
- Ozone concentrations do not tend to be persistently high (generally under 80 ppb).
- Background NO₂ design concentrations at the nearby Pinnacle State monitor is 26.3 ug/m³. This monitor is upwind of the facility in the prevailing wind direction and downwind of many existing sources in Pennsylvania.

In addition, the use of ARM2 in this case met the 5 criteria for accepting an alternative model (e.g., a beta model) under 40 CFR Part 51 Appendix W AKA the Guideline on Air Quality Models. That is:

1. ARM2 has been scientifically peer reviewed. It was presented at several modeling forums including the 10th Modeling Conference and the 2013 EPA Regional/State/Local Modeler's Workshop in Dallas, Texas with documentation available in the respective docket and SCRAM website.
2. ARM2 has been demonstrated to be applicable to the problem on a theoretical basis. The technique considers atmospheric transformation of NO_x to NO₂ and indirectly accounts for variability of these emissions.
3. The databases which are necessary to perform the analysis are available and adequate. Five years of surface and upper air meteorological data was obtained from Elmira Airport and Buffalo International Airport, respectively and processed by NYSDEC for consistent, and technically sound State wide use. Terrain and land use data was available from the USGS. Ambient ozone and NO₂ data was

obtained from NYSDEC monitors located in Pinnacle State Park and Elmira. Corning obtained measured ISR of their existing units.

4. Appropriate performance evaluations have been made by the American Petroleum Institute. The EPA (Model Clearinghouse) also conducted independent evaluations. Corning expanded on the evaluations and further focused on rural sites similar to their location.

5. A protocol was submitted to EPA and NYSDEC which outlined the manner in which it would be used.

Initially, Region 2 was concerned that ARM2 may provide impacts that are less conservative than the Tier 3 OLM method. The applicant does not prefer to use OLM since it does not account for the variability in the facility's operational cycles. In response to this, the applicant provided some more details including a sensitivity analysis that used results from OLM in order to inform the selection of a minimum NO₂/NO_x ratio in ARM2 that would not lend ARM2 to be less conservative. The minimum NO₂/NO_x ratio was determined to be 0.54.

The applicant provided information that showed that the 4 periodic kilns and the volume sources are the sources with controlling impacts. The 4 periodic kilns are the sources with the variable ISR during its cycle which span from 0.2 and 0.8. The periodic kilns do not maintain the same cycle simultaneously so the peak ISR of an individual kiln occurs at different times with other kilns operating with lower ISR.

There are several tunnel kilns. The individual tunnel kiln operates with less fluctuation. However, each of these have a different measured ISR with the worst one being 0.7 and others as low as 0.01. These were modeled at their respective ISR and tend to be less controlling than the periodic kilns or volume sources.

The larger of the volume sources are clustered in the northeast quadrant of the property with the maximum impacts near the fence line and aligned with the prevailing wind direction. These impacts do not tend to overlap with the maximum impact of the kilns. Some of these were modeled with summer and winter emission since the units are seasonally dependent.

It should be noted that the maximum impacts from the combined sources (including background) are close to the facility predominately due to downwash and nearby terrain impacts. Most stacks are 25 meters or less. Given the configuration of sources and short heights, ARM2 should provide conservative estimates since these configurations leave little opportunity for ozone entrainment for NO_x conversion. For these reasons and the reasons stated earlier above, Region 2 believes that the beta ARM2 is a reasonable screening technique for demonstrating compliance with the NO₂ NAAQS and increment in this case. It is also an interesting observation that the 0.54 proposed minimum ambient ratio is essentially equal to the 0.5 default ISR for the more refined OLM/PVMRM techniques. We seek your concurrence. Please let us know if you have any questions.

cc: via email:

Tyler Fox, Chief, AQMG, OAQPS

Chris Owen, AQMG, OAQPS

Roger Brode, AQMG, OAQPS

Steven C. Riva, Chief, Permitting Section, Region 2

Frank Jon, Permitting Section, Region 2