UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
FOUR PENN CENTER – 1600 JOHN F. KENNEDY BLVD.
PHILADELPHIA, PENNSYLVANIA 19103

MEMORANDUM

SUBJECT: Model Clearinghouse review of an alternative model application of AERCOARE in conjunction with AERMOD in Support of Outer Continental Shelf PSD air permitting of the Coastal Virginia Offshore Wind-Commercial wind power project

FROM: Timothy A. Leon Guerrero, Meteorologist
Air Analysis Branch, Air & Radiation Division
EPA Region 3, Philadelphia, Pennsylvania

TIMOTHY LEON-GUERRERO
Digitally signed by TIMOTHY LEON-GUERRERO
Date: 2022.10.06 14:29:37 -04'00'

THROUGH: Alice Chow, Branch Chief
Air Analysis Branch, Air & Radiation Division
EPA Region 3, Philadelphia, Pennsylvania

ALICE CHOW
Digitally signed by ALICE CHOW
Date: 2022.10.11 06:32:45 -04'00'

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

(via email at bridgers.george@epa.gov)

The U.S. Environmental Protection Agency (EPA) Region 3 office seeks concurrence from the Model Clearinghouse regarding its approval of a request for the use of an alternative model for an Outer Continental Shelf (OCS) Prevention of Significant Deterioration (PSD) permit. Region 3 seeks Model Clearinghouse concurrence to use the Coupled Ocean-Atmosphere Response Experiment (COARE) bulk flux algorithm, as implemented in the meteorological data processor program (AERCOARE), to prepare meteorological data for use with the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD). AERCOARE, a meteorological data preprocessor program, will be used in conjunction with AERMOD (AERCOARE/AERMOD) to conduct an air quality impact analysis as part of the OCS air permit application for the Coastal Virginia Offshore Wind-Commercial (CVOW-C) project off the coast of Virginia.

On 19 July 2022, the Virginia Electric and Power Company, doing business as Dominion Energy Virginia (Dominion) formally submitted a request to EPA Region 3 to use AERCOARE/AERMOD as an alternative model for assessing air quality standards compliance for the CVOW-C emission sources located over water. AERCOARE/AERMOD was proposed as part of Dominion's 19 July 2022 modeling protocol in lieu of the Offshore and Coastal Dispersion (OCD) model, which is the Guideline on Air Quality Models (40 CFR 51 Appendix W) preferred model for over-water dispersion. Dominion submitted a revised alternative model request on 29 September 2022 accounting for adjustments in the 5-year representative meteorological period used in its modeling analysis.

Section 3.2.1(b) of Appendix W outlines the general process of how alternative models are approved. In accordance with this section, Regional Administrators have delegated authority to issue such approvals under section 3.2. Such approvals are issued after consultation with the EPA's Model Clearinghouse and formally documented in a concurrence memorandum from the EPA's Model Clearinghouse which demonstrates that the requirements within section 3.2 for use of an alternative model have been met.

EPA Region 3 based its approval of Dominion's request to use the AERCOARE/AERMOD model for its air quality impact analysis, under 40 CFR Part 51, Appendix W §3.2.2(b)(3). Under 3.2.2(b)(3), an alternative model may be used if the Regional Office finds the conditions specified in Appendix W §3.2.2(e) are satisfied. Dominion's revised 29 September 2022 alternative model request memo presents specific responses to the 5 points (*i-v*) outlined in section 3.2.2(e).

EPA Region 3 thoroughly reviewed Dominion's submittal and agrees that an alternative model (AERCOARE/AERMOD) is justified for this application. A summary of these points will be presented in the following sections of this memo. Dominion's alternative model request submittal is also included as an enclosure. We seek the Model Clearinghouse's concurrence as part of the modeling demonstration for the CVOW-C project's permit application process.

Background and Project Overview

The CVOW-C wind farm project will be located in the Commercial Lease of Submerged Lands for Renewable Energy Development on the OCS Offshore Virginia (Lease No. OCS-A-0483). This lease area was awarded through the Bureau of Ocean Energy Management competitive renewable energy lease auction in 2013. The Lease Area covers approximately 450 square kilometers. The nearest shoreward boundary is approximately 44 km off the Virginia Beach coastline, while the farthest oceanward boundary is located approximately 65 km from the nearest point of land. A figure showing the lease area and nearest land features is included in Dominion's revised alternative model request (see enclosure).

When completed, the CVOW-C wind farm project is expected to provide between 2,500 and 3,000 megawatts (MW) of clean, reliable offshore wind energy; to increase the amount and availability of renewable energy to Virginia and North Carolina consumers; to create the opportunity to displace electricity generated by fossil fuel-powered plants, and to offer substantial economic and environmental benefits to the Commonwealth of Virginia. Dominion's preferred buildout design scenario for CVOW-C includes:

- Up to 176 wind turbine generators (WTGs) and associated WTG foundations
- 3 offshore substations (OSSs) and associated offshore substation foundations, which will each include a backup diesel generator and switchgears making them permanent OCS sources
- Up to 484 km of inter-array cables between turbines
- Up to 9 buried submarine high-voltage alternating-current offshore export cables

Although the wind turbines themselves do not emit air pollutants and are, therefore, not "OCS sources" as defined in 40 CFR 55, jack-up vessels are expected to be used to construct the wind turbines. Air emissions from CVOW-C will primarily consist of products of combustion from the vessels associated with the construction and operation phases of this project.

Technical Basis for Alternative Model Request

Dominion is requesting to use AERCOARE as an alternative to replace the regulatory AERMET preprocessor program that is specifically designed for applications over land. AERCOARE will read and process overwater meteorological data using the COARE methodology that was specifically designed for marine applications. The output from AERCOARE can then be used for input to AERMOD for modeling applications in a marine environment, such as the CVOW-C's primary OCS sources. The Offshore and Coastal Dispersion or OCD dispersion model is currently listed as EPA's preferred model for over-water modeling and is briefly described in Section 4.2.2.3 of 40 CFR Part 51 Appendix W.

Dominion prefers AERCOARE/AERMOD over OCD for the following technical reasons:

1. The OCD modeling system was developed in the 1980-90s and as such the dispersion algorithms are outdated and have not been updated to account for advancements in dispersion modeling since that time. In contrast, AERMOD is frequently updated (the latest version was recently issued in June of 2022) and is considered the state-of-the-art for nearfield dispersion modeling.
2. The AERMOD model utilizes the Plume Rise Model Enhancements (PRIME) downwash algorithms to assess impacts in the cavity and wake regions of structures. For offshore wind projects, the vessels themselves may affect the wind flow in the area and cause aerodynamic downwash. This effect can be treated in AERMOD using the vessels as structures in the PRIME algorithms. In contrast, the OCD model only provides downwash for platform structures and is based on more simplistic algorithms.
3. Unlike OCD, AERMOD does not specifically evaluate downwash conditions for platform structures. Therefore, the Project's OSS platform structures will be conservatively evaluated with BPIPPRM by assuming the platform structures extend all the way down to the sea. This is a very conservative assumption since, in reality, air will flow under these structures.
4. AERMOD has the capability to treat missing or calm wind hours by implementing the calm wind processing procedures recommended in Appendix W. In contrast, OCD does not have the ability to process either missing or calm hours and to address this in accordance with the recommended Appendix W procedures; a postprocessor would need to be developed.
5. AERMOD incorporates options for the treatment of the conversion from oxides of nitrogen (NO_x) to nitrogen dioxide (NO_2). Multiple tier NO_x to NO_2 conversion techniques are available in AERMOD. OCD does not employ any NO_2 conversion techniques and only assumes full conversion of NO_x to NO_2. Some of the NO_2 conversion methods available in AERMOD could be applied to the OCD predicted concentrations in a postprocessing step, but to account for the Tier 2 ARM2 technique or Ozone Limiting Method (OLM), a custom postprocessor for OCD must be developed. The Plume Volume Molar Ratio Method (PVMRM) could not be implemented in a postprocessing step, as the adjustments to the predicted concentrations are internal to the AERMOD model calculations that are dependent on the plume characteristics.
6. AERMOD incorporates options for the inclusion of varying ambient background concentrations. Potential hourly varying background concentrations for the 1-hr NO_2 and SO_2 standards are described in more detail in EPA's 1 March 2011 clarification memo entitled "*Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard*". In contrast, OCD does not have an option to incorporate ambient background concentrations within the model. Ambient background concentrations could be applied to the OCD predicted concentrations in a postprocessing step, though a custom postprocessor for OCD would need to be developed to accomplish this.
7. AERMOD can generate the output concentrations in the form required for comparison to the newer multi-year averaged statistically based NAAQS, namely for 1-hour NO_2, 1-hour SO_2, and

24-hour and annual PM-2.5. OCD, latest version posted to SCRAM in 2000, cannot output any statistical or multi-year average results. For a proper comparison to these (post 2000) statistically based NAAQS, a custom postprocessor for OCD must be developed.

8. The AERCOARE meteorological processor utilizes the COARE algorithm that uses air-sea temperature difference, overwater humidity and wind speed to estimate the heat fluxes in the atmosphere over water. AERCOARE is expected to be appropriate for use in marine conditions at all ice-free latitudes. For this application of modeling offshore sources, the use of AERCOARE to prepare the meteorological data for use in AERMOD is more appropriate than using AERMET, the regulatory meteorological processor that is part of the AERMOD modeling system.
9. Modeling of the temporally and spatially varying construction emission sources will be done with an hourly emissions input scheme that will necessitate many unique emission points. OCD limits the number of stationary (point) sources to 8,500. AERMOD does not limit the number of sources. Additionally, AERMOD allows for the use of volume source types, a source type not available in OCD.
10. The lease area is quite large and will necessitate a substantial number of receptors be defined to ensure maximum impact concentrations are determined. OCD limits the number of receptors (3,000 discrete, 720 polar, and 1,600 cartesian). AERMOD does not place a limit on the number of receptors.
11. Unlike OCD, AERMOD does not specifically treat angled stack exhaust emissions. AERMOD is configured to treat vertical or horizontal venting stacks, but not angled stacks (between vertical and horizontal). Because many of the CVOW-C project emission sources are vessels, the model inventory will include angled stacks. Modeling will conservatively treat the exhaust emissions from these stacks by using the horizontal stack options. This is a conservative approach which effectively takes credit for the plume rise due to buoyancy but does not take any credit for the momentum plume rise.

Unlike OCD, AERMOD does not include algorithms to evaluate shoreline fumigation conditions. However, shoreline fumigation is not expected to be an important impact consideration for the CVOW-C primary emission sources. Shoreline fumigation can occur when plumes traveling in relatively stable air near the shoreline encounter the thermal internal boundary layer (TIBL) and fumigate downward, potentially resulting in elevated pollutant concentrations at the ground. The TIBL is the boundary layer that can form between the more stable over-water air mass and the less stable over-land air mass and typically forms during sea breeze conditions.

EPA modeling guidance indicates that shoreline fumigation can be an important phenomenon on and near the shoreline of bodies of water for sources with tall stacks located on or just inland of a shoreline. However, CVOW-C (primarily vessels) emissions are emitted from stacks with low release heights that will generally be located far offshore (the lease area is located 41 kilometers or more offshore). Exhaust plumes are expected to be substantially dispersed before encountering the TIBL and potential fumigation conditions. Therefore, shoreline fumigation is not expected to be an important impact condition for CVOW-C emissions and is not proposed to be specifically evaluated for Dominion’s final air quality impact analysis.

Modeling Approach

A modeling protocol was submitted to EPA Region 3 by Dominion on 19 July 2022. It outlined the general modeling procedures to be followed for the CVOW-C project. An air quality impact analysis for the CVOW-C project is required under 40 CFR Part 52.21 and 40 CFR Part 55. EPA Region 3 sent a letter to Dominion on 22 September 2022 confirming the status of their modeling protocol and directing them to commence modeling activities consistent with that protocol.

Dominion's modeling protocol describes the use of AECOARE/AERMOD in the pending air-quality impact analysis. Meteorological data collected at buoy station #44014 located approximately 119 kilometers east of Virginia Beach, VA and approximately 41 kilometers to the southeast of the southeast corner of the lease area will be processed with AERCOARE to create the overwater meteorological data files for the air quality impact analysis. Buoy station #44014 is owned and maintained by the National Data Buoy Center. Overwater meteorological parameters include wind direction and speed, sea level pressure, dew point temperature, air temperature, water surface temperature and relative humidity.

EPA has reviewed the proposed meteorological data and determined that it is representative of the lease area that will be part of the CVOW-C project. This portion of the OCS has limited buoy data measurements. None the less, EPA feels buoy station #44014 provides measurements that are representative of the CVOW-C lease area.

EPA's Appendix W section 8.4.1(b) provides several factors that should be considered when determining meteorological data representativeness. These include distance between the project and meteorological collection site, the complexity of terrain, the meteorological collection site's exposure and the time period in which the data were collected. Given the buoy is located over the open waters of the eastern Atlantic Ocean, many of the factors cited in Appendix W related to local topographic features are not relevant. Given there are no real impediments or undue influences from land-based terrain features, surface buoy measurements may be representative of atmospheric flows over much larger areas than comparable measurements in terrain features observed over much of EPA Region 3.

A 5-year record of representative meteorological record was selected for the modeling analysis. EPA ensured that the meteorological record met completeness requirements described under section 8.4.3 of Appendix W. Dominion's modeling protocol contains a more complete description of the AERCOARE/AERMOD processing steps for the use of in its air quality impact analysis. We expect additional description of the alternative model processing to be included in Dominion's final air quality impact analysis report that will be submitted with the final permit application.

Alternative Model Proposal Review

Regulatory Analysis and Background

The PSD regulations, 40 CFR Part 52.21(l), state that all applications of air quality modeling shall be based on the preferred models specified in Appendix W. Section 40 CFR Part 52.21(l)(2) also provides on a case-by-case basis that an alternative air quality dispersion model may be used if written approval from the EPA Regional Administrator is obtained. The alternative model approval process and conditions are outlined in Section 3.2 of the Appendix W. Section 3.2.2(a) specifies that the determination of acceptability of an alternative model is an EPA Regional Office responsibility in consultation with EPA's Model Clearinghouse (MCH). An alternative model may be used subject to

Regional Office approval if found to satisfy the requirements listed in Section 3.2.2. Section 3.2.2(e) sets forth the 5 elements that must be satisfied for alternative model approval:

i. The model or technique has received a scientific peer review
ii. The model or technique can be demonstrated to be applicable to the problem on a theoretical basis
iii. The databases which are necessary to perform the analysis are available and adequate
iv. Appropriate performance evaluations of the model or technique have shown that the model or technique is not inappropriately biased for regulatory application
v. A protocol on methods and procedures to be followed has been established

EPA will provide a more detailed analysis of these 5 elements from Appendix W section 3.2.2(e) in the next section of this alternative model concurrence request.

Evaluation of Approach Under Appendix W Section 3.2.2(e)

Justification for the use of AERCOARE/AERMOD in Dominion's air modeling analysis are discussed in more detail below for each of the 5 elements in Appendix W section 3.2.2(e). EPA Region 3 has reviewed Dominion's support under these 5 elements and determined that the alternative model request is supported through these points.

i. The model or technique has received a scientific peer review

As described in the 2011 EPA Region 10 approval (and referenced in the 2019 EPA Region 6 approval and 2022 EPA Region 1 and 2 approvals[1]), the science behind the COARE algorithm, which is incorporated into AERCOARE, has been published in scientific peer review journals. In its approval, Region 10 confirmed the scientific legitimacy and applicability of the COARE algorithm to various over-water conditions through a sufficient body of peer-reviewed literature. The Region 10 approval also documented that the algorithms in COARE are configured to handle a wide range of temperature gradient conditions including the extremes that could be found in the Arctic or the tropics.

A key peer reviewed article that demonstrated the effectiveness of the COARE 3.0 algorithm when compared to datasets from multiple air-sea flux and bulk meteorological data collection campaigns was presented by Fairall *et al.* in 2003.

Wong *et al*. also described the concepts and configuration of the AERCOARE model and its association with AERMOD in the 2016 peer-reviewed article by Region 10 and partner scientists.

These points demonstrate that AECOARE has undergone scientific peer review.

ii. The model or technique can be demonstrated to be applicable to the problem on a theoretical basis.

EPA has previously found the AERCOARE/AERMOD approach to be applicable, on a theoretical basis, for the simulation of pollutant dispersion in the marine atmospheric boundary layer for other OCS projects. In the April 2011 Region 10 alternative model approval, EPA deemed AERCOARE/AERMOD to be appropriate for use in the Arctic marine ice-free environment. In the

[1] See EPA's Model Clearinghouse Information Storage and Retrieval System at: https://cfpub.epa.gov/oarweb/mchisrs/ Individual concurrence memos referenced here can be accessed by selecting the year and EPA region.

2019 Region 6 AERCOARE/AERMOD alternative model approval, EPA determined the model was also appropriate on a theoretical basis for use in the subtropical marine environment off the coast of Louisiana. In the 2022 AERCOARE/AERMOD approval for the Park City Wind project, EPA Region 1 deemed it was appropriate on a theoretical basis for use in the marine environment off the coast of Massachusetts. In addition, as shown below, EPA's current user manual for AERCOARE (U.S. EPA, 2012) indicates that AERCOARE is expected to be appropriate for marine conditions at all latitudes:

> "AERCOARE uses Version 3.0 of the COARE algorithm that has been updated several times since the initial international TOGA-COARE field program in the western Pacific Ocean from November 1992 to February 1993. The basic algorithm uses air-sea temperature difference, overwater humidity, and wind speed measurements to estimate the sensible heat, latent heat, and momentum fluxes. The original algorithm was based on measurements in the tropics with winds generally less than 10 m/s but has since been modified and extensively evaluated against measurements in high latitudes with winds up to 20 m/s. Based on these studies, AERCOARE is expected to be appropriate for marine conditions found at all latitudes including the Arctic."

As described in the AERCOARE user's manual, AERCOARE calculates the meteorological input parameters needed for AERMOD by accounting for heat flux to and from the atmosphere due to the difference in temperature between the water surface and the air. AERMOD alone does not depend on parameterizations specific to overland conditions. The meteorological inputs provided by AERCOARE (for input into AERMOD) provide the information necessary to parameterize the structure of the marine atmospheric boundary layer using Monin-Obukhov Similarity Theory. This parameterization scheme is universally applicable to over-land and over-water domains. The COARE 3.0 algorithms use standard meteorological variables such as wind speed, air temperature, relative humidity, and water temperature to determine bulk transfer coefficients used in Monin-Obukhov Similarity Theory to describe the structure of the atmospheric surface layer.

Based on the information summarized above, we believe that the coupled AERCOARE/AERMOD modeling approach is applicable to the CVOW-C project on a theoretical basis.

iii. The databases which are necessary to perform the analysis are available and adequate.

Appendix W refers to the databases collected to develop and verify the proposed modeling methodologies. The meteorological databases that were used to develop the COARE algorithms for marine conditions are publicly available in the scientific literature. Datasets from previous dispersion experiment studies have been used to verify the accuracy of the AERCOARE/AERMOD modeling approach. There are 4 comprehensive historical overwater dispersion datasets available in the record that involve study of air pollutant dispersion in the marine atmospheric boundary layer. The following 4 tracer gas studies from the 1980s have been used in performance evaluations of OCD, CALPUFF, and AERCOARE/AERMOD:

- Cameron, Louisiana: July 1981 and February 1982 (Dabberdt, Brodzinsky, Cantrell, & Ruff, 1982)
- Carpinteria, California: September 1985 (Johnson & Spangler, 1986)
- Pismo Beach, California: December 1981 and June 1982 (Schacher, et al., 1982)
- Ventura, California: September 1980 and January 1981 (Schacher, et al., 1982)

The Region 10 alternative model approval of AERCOARE/AERMOD utilized tracer gas experiments from the 4 studies listed above. In all of the previous alternative model approvals, EPA determined that these datasets were adequate for verification of the AERCOARE/AERMOD system.

Additional information was provided by Vineyard Wind to Region 1 to demonstrate the referenced tracer studies were sufficiently representative of the Park City Wind project's marine environment off the coast of Massachusetts. Dominion provided a similar analysis of key meteorological parameters statistics for the Virginia Beach buoy station (#44014) used for the CVOW-C project. As noted previously, the buoy is located approximately 41 kilometers southeast of the southeast corner of the CVOW-C lease area and is the nearest offshore meteorological station with the necessary meteorological parameters. Table 1 (see enclosure) summarizes key meteorological data and compares them to data from the tracer studies. The data demonstrates that the range of atmospheric conditions that typically occur in the Virginia offshore region fit the range of conditions used to develop and verify the COARE 3.0 algorithm.

We believe the meteorological dataset from buoy station #44014 proposed for use in AERCOARE and the 4 tracer studies data sets used in the evaluation of the COARE 3.0 algorithms in AERCOARE are sufficiently available and adequate for determining the effectiveness of the proposed modeling approach.

iv. Appropriate performance evaluations of the model or technique have shown that the model or technique is not inappropriately biased for regulatory application.

Previous performance evaluations have demonstrated that AERCOARE/AERMOD predicted concentrations are not biased toward underestimates. EPA Region 10's approval of AERCOARE/ AERMOD relied on the results of demonstrations showing no bias toward underestimates, using the overwater study datasets listed previously. EPA Region 6's approval of AERCOARE/AERMOD also relied on the demonstrations presented in the EPA Region 10 approval. The Region 10 evaluation described in the AERCOARE/AERMOD predictions from 3 of the 4 tracer study datasets (the Ventura dataset was not included because it was considered not representative due the receptors being located well inland and not representative of marine conditions) using various combinations of meteorological data (including different approach to mixing height calculation, use or no use of wind direction variance, and other settings). A statistical analysis was conducted to evaluate whether the AERCOARE/AERMOD alternative modeling approach was biased towards underpredictions.

EPA Region 1's approval considered quantile-quantile (Q-Q) plots for the Cameron and Pismo Beach studies, comparing the combinations of AERCOARE/AERMOD simulations to measurements from each study. These Q-Q plots demonstrate the model tends to overestimate concentrations at the upper-end of the distribution for both studies. The plot for the Cameron case shows that the highest predicted concentrations match well with observations. The plot for the Pismo Beach case shows that the highest predicted concentrations are much greater than the observations, exceeding by more than the factor-of-2 threshold. Region 10's approval included a Q-Q plot of the results from the Carpinteria study. The Carpinteria data showed the AERCOARE/AERMOD results at the upper tail of the distribution exceeded the observations. This data also showed that the 5 combinations of AERCOARE configurations tested result in predicted concentrations that are all generally of the same magnitude.

Both the original Region 10 approval study and a U.S. EPA (2015) study included evaluations of the sensitivity of the modeling results to a minimum mixing height. As described in the Region 10 approval, the AERCOARE/AERMOD results were shown to be highly overpredicted when using AERMOD's default minimum mixing height of 1 meter. Region 10's sensitivity study, summarized in ENVIRON (2012) found a minimum mixing height of 25 meters for overwater applications was more physically realistic and resulted in better model performance. The Region 10 approval allowed for the use of a minimum mixing height of 25 meters for the application of AERCOARE/AERMOD and a minimum limit on the absolute value of Monin-Obukhov Length of 5 meters. These limits are recommended in the EPA's AERCOARE User's Guide.

Based on the study information described above, we believe it is evident the AERCOARE/AERMOD approach is not likely to result in underprediction of concentrations, but rather more likely the approach is conservative.

v. A protocol on methods and procedures to be followed has been established.

Dominion submitted a revised modeling protocol to EPA Region 3 on 19 July 2022 for the CVOW-C project's proposed air modeling analysis. This protocol addressed EPA Region 3's comments to Dominion's March 2022 draft modeling protocol and outlined the modeling procedures to be employed in the air modeling analyses including the use of AERCOARE/AERMOD. Dominion intends to run AERCOARE using the following settings recommended in EPA's AERCOARE User's Guide:

- The default threshold wind speed will be used to identify calm hours (i.e., WSCALM = 0.5 m/s). Wind speeds below this value will be considered calms
- Mechanical mixing heights will be calculated by AERCOARE from the friction velocity using the Venkatram method. During convective hours, the convective mixing height will be set to the mechanical mixing height. The same smoothing technique as employed in AERMET will be used. The default minimum mixing height of 25 meters will be assigned
- Warm layer and cool-skin effects will not be considered
- Friction velocity will be determined from wind speed only; wave-height will not be considered

These actions should demonstrate that the protocol establishment element is adequately addressed.

Conclusion

EPA Region 3 has reviewed Dominion's alternative model request submittal and has determined that the proposed AERCOARE/AERMOD modeling approach is acceptable as an alternative model for the air quality impact analysis submitted in support of its OCS air permit application. We find that the proposed approach addresses the 5 elements contained in Section 3.2.2(e) of 40 CFR 51 Appendix W.

In accordance with Appendix W sections 3.0(b) and 3.2.2(a), Region 3 currently intends to approve the use of AERCOARE/AERMOD as an acceptable alternative model for the CVOW-C project. We seek the concurrence from the Model Clearinghouse. As with the other alternative model approvals of AERMOD-COARE, approval to use this alternative model is made on a case-by-case basis. Should an air permit applicant or state desire to use AERCOARE/AERMOD in an overwater modeling analysis for a different facility and/or location, a request for alternative approval must be made to the appropriate EPA Regional Office containing the appropriate technical justifications/demonstrations consistent with applicable sections of Appendix W.

References

Dabberdt, W., Brodzinsky, R., Cantrell, B., & Ruff, R. (1982). Atmospheric Dispersion Over Water and in the Shoreline Transition Zone, Final Report Volume II: Data. Menlo Park, CA: Prepared for American Petroleum Institute by SRI International.

ENVIRON (2012). Evaluation of the Combined AERCOARE/AERMOD Modeling Approach for Offshore Sources. Prepared for U.S. Environmental Protection Agency Region 10, Seattle, WA. EPA Contract EP-D-08-102, Work Assignment 5-17, EPA 910-R-12-007, October 2012.

Fairall, C.W.; Bradley, E.F.; Hare, J.E.; Grachev, A.A.; Edson, J.B. (2003). Bulk Parameterization of Air-Sea Fluxes: Updates and Verification for the COARE Algorithm. Journal of Climate, Vol. 16, pp. 571-591.

Johnson, V., & Spangler, T. (1986). Tracer Study Conducted to Acquire Data for Evaluation of Air Quality Dispersion Models. San Diego, CA: WESTEC Services, Inc. for the American Petroleum Institute.

Schacher, G., Spiel, D., Fairall, C., Davidson, K., Leonard, C., Reheis, C. (1982). California Coastal Offshore Transport and Diffusion Experiments: Meteorological Conditions and Data. Monterey, CA: Report NPS-61-82-007, Naval Postgraduate School.

U.S. EPA (2012). User's Manual AERCOARE Version 1.0, EPA 910-R-12-008, October 2012.

U.S. EPA (2015). Combined WRF/MMIF/AERCOARE/AERMOD Overwater Modeling Approach for Offshore Emission Sources, Vol. 2. EPA 910-R-15-001b, October 2015.

Wong, H.; Elleman, R.; Wolvovsky, E.; Richmond, K.; Paumier, J. (2016). AERCOARE: An overwater meteorological preprocessor for AERMOD, Journal of the Air & Waste Management Association, 66:11, 1121-1140.

Enclosure

cc: Cristina Fernández, Director, Air & Radiation Division
Gwen Supplee, Air & Radiation Division, Permits Branch